

Spent Nuclear Fuel Discharges from U.S. Reactors 1994

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List of Commonly Used Acronyms

AC	Allis Chalmers	MTIHM . .	metric tons of initial heavy metal
ANF	Advanced Nuclear Fuel	MTU	metric tons of uranium
ANFDCS .	Automated Nuclear Fuel Data Collection System	MWe	megawatts electric
ANS	American National Standard	NA	not available
ANSI	American National Standards Institute	NAC	NAC International
B&W	Babcock & Wilcox	NFA	nonfuel assembly
BPRA . . .	burnable poison rod assembly	NFC	nonfuel components
BWR	boiling-water reactor	NFS	Nuclear Fuel Service
CDB	Characteristics Data Base	NRC	Nuclear Regulatory Commission
CE	ABB Combustion Engineering	NSSS	Nuclear Steam System Supplier
CEA	control element assembly	NU	Nuclear Materials and Equipment Corporation
CFR	Code of Federal Regulations	NUCDIS . .	Nuclear Data Information System
CRA	control rod assembly	NUHOMS . .	Nuclear Horizontal Modular System
CRWMS . .	Civilian Radioactive Waste Management System	NWPA	Nuclear Waste Policy Act of 1982, as amended
DOE	U.S. Department of Energy	OCRWM . .	Office of Civilian Radioactive Waste Management
DSC	dry shielded cask	OFA	Optimized Fuel Assembly
EIA	Energy Information Administration	ORNL	Oak Ridge National Laboratory
EIS	environmental impact statement	PWR	pressurized-water reactor
GA	General Atomics	QA	quality assurance
GE	General Electric Nuclear Energy	RCCA	rod cluster control assembly
GWDt . . .	gigawattdays thermal	RD	retired
HLW	high-level waste	SD	shut down
HSM	horizontal storage module	SIEM	Siemens Nuclear Corporation
HTGR . . .	high-temperature, gas-cooled reactor	SNF	spent nuclear fuel
ID	identification	SRM	short range monitor
IDB	Integrated Data Base	TIP	transverse incore probe
IFBA	integral fuel burnable absorber	TN	Transnuclear, Inc.
INEL	Idaho National Engineering Laboratory	U.S.	United States
IRM	intermediate range monitor	UDB	Unified DataBase
ISFSI	independent spent fuel storage installation	UNC	United Nuclear Corporation
LOPAR . .	low parasitic	USC	United States Code
LWR	light-water reactor	VSC	ventilated storage cask
MPC	multipurpose canister	WE	Westinghouse Electric
		ZIRLO	zirconium-niobium alloy

Preface

Spent Nuclear Fuel Discharges from U.S. Reactors 1994 provides current statistical data on fuel assemblies irradiated at commercial nuclear reactors operating in the United States. This year's report provides data on the current inventories and storage capacities at these reactors. The report was prepared by the Energy Information Administration (EIA) under a Memorandum of Understanding with the Office of Civilian Radioactive Waste Management. The EIA is the independent agency for data collection and analysis within the U.S. Department of Energy (DOE).

Data are collected on Form RW-859, "Nuclear Fuel Data" survey, and provide a comprehensive statistical characterization of the industry's activities for the survey year and include some information about industry plans and commitments for the future. Detailed statistics on the data are presented in four chapters that highlight 1994 spent fuel discharges, storage capacities and inventories, canister and nonfuel component data, and assembly characteristics. Five appendices, a glossary, and bibliography are also included.

Chapter 1 provides detailed data on reactor spent fuel discharge and storage activity for 1994, nuclear power plant data, annual discharges, enrichment and burnup, and fuel stored at away-from-reactor storage facilities. Data on site capacities and inventories at utilities and storage facilities, as well as dry storage at utilities, are presented in Chapter 2. Chapter 3 contains data on canisters and their contents and nonfuel components for each storage pool site. The final chapter presents assembly type characteristics, including data on background, fabricator summary, assembly distribution, and assembly identifiers.

Appendix A provides information on the methodology used in the survey, including data collection procedures and data editing, analysis, and processing. Appendix A also includes a copy of the 1994 Form RW-859 survey. The quantities and characteristics of each specific fuel assembly type discharged by each reactor are described in Appendix B. A series of pictograms showing storage site and pool configurations,

capacities, and inventories, are presented in Appendix C. A description of the EIA Quality Assurance reports and a more detailed discussion of EIA Quality Assurance procedures are included in Appendix D. Appendix E contains technical notes providing further details on information contained in the report.

The data are used by a wide audience, including Congress, Federal and State agencies, the nuclear and electric industries, and the general public. They also constitute one of the inputs to the Characteristics Data Base developed by Oak Ridge National Laboratory and maintained by TRW Environmental Safety Systems, Inc. The discharge dates, assembly types, burnups, and initial enrichments are used to calculate the gamma, neutron, and thermal source intensities. These radiological characteristics, along with reported fuel quantities and dimensions, are then used by the Civilian Radioactive Waste Management System designers in scoping studies for shielding design, thermal design, and sizing of facilities and equipment.

The underlying data are also used in the *Acceptance Priority Ranking and Annual Capacity Report*. The report details the order in which DOE will allocate Federal waste acceptance capacity. As required by the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (10 CFR 961), the ranking is based on the age of permanently discharged spent nuclear fuel, with the owners of the oldest spent nuclear fuel, on an industry-wide basis, given the highest priority.

The DOE estimates future discharges from U.S. commercial nuclear reactors and the characteristics of those discharges based on trends of historical spent nuclear fuel data provided by the respondents and on burnup projections. The need for additional spent fuel storage capacity is based on these estimated cumulative discharges and on the estimated maximum storage capacity of both at-reactor and away-from-reactor storage facilities.

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Executive Summary

The Energy Information Administration of the U.S. Department of Energy (DOE) administers the Nuclear Fuel Data survey, Form RW-859, for the Office of Civilian Radioactive Waste Management. This form is used to collect data on fuel assemblies irradiated at commercial nuclear power reactors operating in the United States, and the current inventories and storage capacities of those reactors. The data are important to the design and operation of the equipment and facilities that DOE will use for the future acceptance, transportation, and disposal of spent fuel. The information presented in this report summarizes the detailed data collected on Form RW-859 that focuses on commercial light-water reactor (LWR) spent nuclear fuel reported as discharged as of December 31, 1994. The report identifies trends in discharged spent fuel, burnup levels, spent fuel inventories, and site capacities.

Spent Nuclear Fuel Discharges

A total of 104,742 assemblies, with an initial loading weight of 30,003.3 metric tons of uranium (MTU)

(Table ES1), have been discharged from 118 commercial LWR's from 1968 through 1994. Electric utilities also reported 172 temporarily discharged assemblies at pressurized-water reactors (PWR's) and 626 temporarily discharged assemblies at boiling-water reactors (BWR's). Approximately 36 percent (10,901.3 MTU) of total discharges (by weight) are from BWR's; 64 percent 19,102.0 MTU) from PWR's. Reprocessed spent fuel, fuel from the damaged Three Mile Island Unit 2 reactor, and discharges from Fort St. Vrain (the only commercial high-temperature, gas-cooled reactor in the United States), are not within the scope of this report.

The characteristics of the permanently discharged spent fuel have changed over time. Prior to 1972, most spent commercial nuclear fuel discharged was reprocessed. Since that time, the annual average burnup for discharged BWR assemblies has shown a fairly steady increase to reach a new high of 33.1 gigawattdays thermal per metric ton of uranium (GWDt/MTU) in 1994. The average burnup has also continued to increase for PWR's, reaching a new high of 40.0 GWDt/MTU in 1994.

Table ES1. Total U.S. Commercial Spent Nuclear Fuel Discharges, 1968-1994

Reactor Type	Number of Assemblies		
	Stored at Reactor Sites	Stored at Away-from-reactor Facilities	Total
Boiling-Water Reactor	57,187	2,957	60,144
Pressurized-Water Reactor	44,107	491	44,598
Total	101,294	3,448	104,742
Reactor Type	Metric Tons of Uranium		
	Stored at Reactor Sites	Stored at Away-from-reactor Facilities	Total
Boiling-Water Reactor	10,347.3	554.0	10,901.3
Pressurized-Water Reactor	18,909.4	192.6	19,102.0
Total	29,256.7	746.6	30,003.3

Notes: A number of assemblies discharged prior to 1972 were reprocessed and are not included in this table. A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 24.2 metric tons of uranium (MTU), were discharged. These HTGR fuel elements are not included in the above table. Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

At the end of 1994, a total of 3,448 of the assemblies covered by this report were in storage at five away-from-reactor storage facilities. Typically, assemblies were moved either to free up space in the discharging reactor's storage site or for use in a research program.

Site Capacities and Inventories, 1994

The total inventory of discharged LWR spent nuclear fuel in storage in the United States, as of December 31, 1994, was 104,742 assemblies. The majority of spent nuclear fuel is stored in water-filled pools, but 1,525 assemblies are in dry storage at Independent Spent Fuel Storage Installations (ISFSI's) at Baltimore Gas and Electric Company's Calvert Cliffs plant, Carolina Power and Light Company's Robinson 2 plant, Consumers Power Company's Palisades plant, Duke

Power Company's Oconee plant, and Virginia Power's Surry plant. This section includes a fold-out map showing the location of the commercial nuclear reactors as well as planned and existing ISFSI's. The current licensed storage capacity is 218,803 assemblies. The total maximum storage capacity of all storage sites, as reported by electric utilities and off-site storage, is 218,967 assemblies. However, the excess of total maximum capacity over current total inventory does not reflect the shortage of pool storage in many individual cases. Of the 110 reactors expected to be in operation by the year 2000, 9 reactors appear to require expansion above current pool maximums before 2000.

The quantities of spent nuclear fuel in storage at nuclear power plants and away-from-reactor facilities are aggregated to the state level in Figures ES1 and ES2. The data account for all permanently and temporarily discharged assemblies from commercial nuclear reactors in the United States.

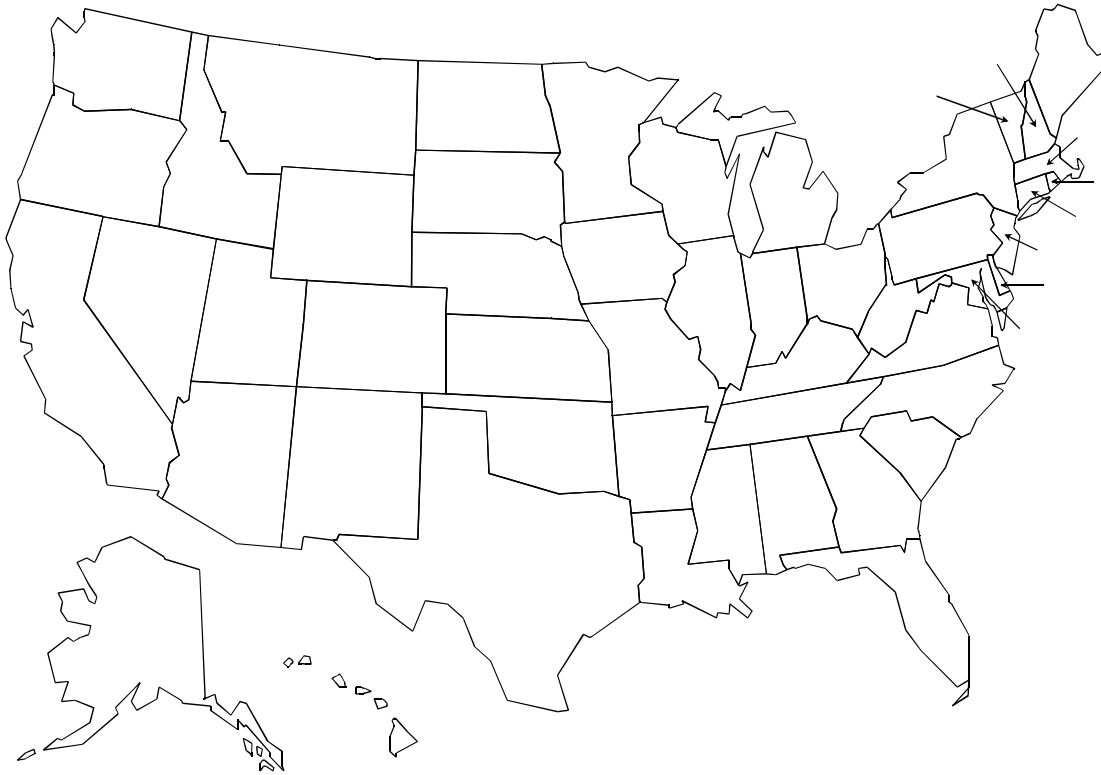
Figure ES1. Commercial Spent Nuclear Fuel in Storage at U.S. Nuclear Power Plants and Away-from-reactor Facilities by State (Assemblies)



Notes: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements are in storage (744 in Idaho and 1,464 in Colorado). These HTGR fuel elements are reflected on this map but are not included in Table ES1. Numbers in the above map represent assemblies stored at nuclear power plant sites and away-from-reactor facilities, and include both permanently and temporarily discharged assemblies.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Figure ES2. Commercial Spent Nuclear Fuel in Storage at U.S. Nuclear Power Plants and Away-from-reactor Facilities by State (Metric tons of uranium)



Notes: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements are in storage (744 with initial uranium content equal to 8.8 metric tons of uranium (MTU) stored in Idaho and 1,464 with initial uranium content equal to 15.4 MTU stored in Colorado). These HTGR fuel elements are reflected on this map but are not included in Table ES1. Numbers in the above map represent the initial uranium content of assemblies stored at nuclear power plant sites and away-from-reactor facilities, and include both permanently and temporarily discharged assemblies.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Canisters and Nonfuel Assembly Hardware

A total of 287 canisters were reported in storage pools as of December 31, 1994. This represents an increase of 18 canisters in 1994. The number of open baskets reported in pools, however, decreased from 321 to 300 in 1994. Of the 287 canisters reported, 145 contain spent nuclear fuel, 101 contain nonfuel items, 19 contain both fuel and nonfuel, and 22 canisters are currently empty.

Nonfuel assembly (NFA) hardware data were collected on all generic and single-reactor assembly class reactors. In 1994, a total of 65,190 NFA hardware items were in storage at spent fuel pools. Of these items, 63,532 NFA items were in storage at 100 generic assembly class reactors, while the remaining 1,658 NFA items were in storage at 8 single-reactor assembly class reactors. No NFA data were reported by 9 generic and 3 single-reactor assembly class reactors.

Assembly Type Characteristics

A total of 134 reactor fuel assembly types have been identified for use in two types of domestic commercial LWR types (BWR and PWR). Each assembly type has a unique combination of distinguishing characteristics such as envelope dimensions, rods per assembly, cladding type, and structural materials. Some types may fit in several different reactors while in some cases, a single reactor may use more than one assembly type. Initial enrichment and discharge burnup can vary significantly within a single assembly type.

Through 1994, 52 BWR fuel assembly types have been discharged from 41 BWR's with five assembly types making up 56 percent of the BWR assemblies discharged. General Electric fabricated about 90 percent of the discharged BWR assemblies. As fabricated, most are 5.44 inches wide, 176.2 inches long, and contain 183 to 195 kilograms (kg) of uranium. Through 1994, 77 PWR's have discharged 54 PWR fuel assembly types with five types making up 53 percent of the PWR assemblies discharged. Westinghouse fabricated about 58 percent of the discharged PWR assemblies. As built, most are 8.44 inches wide, 159.8 inches long, and contain 425 to 460 kg of uranium.

1. Spent Fuel Discharges

Reactor Spent Fuel Discharge and Storage Activity for 1994

The Energy Information Administration of the U.S. Department of Energy (DOE) administers the Nuclear Fuel Data survey, Form RW-859, for the Office of Civilian Radioactive Waste Management. This form is used to collect data on fuel assemblies irradiated at commercial nuclear power reactors operating in the United States, and the current inventories and storage capacities of those reactors. The data are important to the design and operation of the equipment and facilities that DOE will use for the future acceptance, transportation, and disposal of spent fuel. The information presented in this report summarizes the detailed data collected on commercial light-water reactor (LWR) spent nuclear fuel reported as discharged as of December 31, 1994.

A total of 118 U.S. commercial LWR's have discharged spent nuclear fuel as of December 31, 1994. This includes Comanche Peak 2 which discharged spent fuel for the first time in 1994. Of the 118 reactors, 9 reactors are permanently shutdown or retired, 109 reactors are currently in operation.

A total of 58 reactors discharged 6,702 spent nuclear fuel assemblies in 1994 (Table 1). Of these, 6,605 assemblies were classified as permanently discharged and 97 assemblies were classified as temporarily discharged. A total of 3,781 assemblies, containing 675.0 metric tons of uranium (MTU), were permanently discharged from 19 boiling-water reactors (BWR's). A total of 2,824 assemblies, containing 1,207.6 MTU, were permanently discharged from 39 pressurized-water reactors (PWR's). There were 81 BWR and 16 PWR temporarily discharged assemblies.

The cumulative inventory of LWR spent nuclear fuel in storage in the United States as of December 31, 1994, is 104,742 assemblies (30,003.3 MTU). These totals represent an increase from 1993 of 6,342 assemblies (1,867.3 MTU). The number of assemblies discharged in 1994 does not correspond with the increase in the number of assemblies stored because of reinsertion of previously discharged assemblies and revisions to historical survey data from Form RW-859 (Table 2). Transfers of assemblies between storage locations change the number of assemblies in storage at both locations but do not affect the overall number of assemblies in storage. Figures 1 and 2 illustrate pool inventories, annual discharges, and maximum pool capacities for all operating BWR and PWR reactors.

Temporarily discharged assemblies are assemblies that utilities have identified for future reinsertion. The cumulative number of discharged assemblies classified as temporarily discharged increased from 610 assemblies at the end of 1993 to 798 assemblies at the end of 1994 (Table 3). Of these temporarily discharged assemblies, 504 are assemblies from the Long Island Power Authority's Shoreham plant. In 1988, these assemblies were classified as permanently discharged when the Shoreham plant shut down. As a result of the transfer of ownership of the Shoreham fuel to PECO Energy Company, 306 assemblies in 1993 and 254 assemblies in 1994 were reclassified as temporarily discharged. Of these assemblies, 56 were reinserted into PECO's Limerick plant in 1994. (See Technical Note 14 in Appendix E.)

Nuclear Power Plant Data

All data from U.S. commercial LWR's which have discharged and/or are storing nuclear fuel assemblies as of December 31, 1994, are reported on Form RW-859 (Table 4). A total of 118 nuclear plants fall into this category: 41 BWR's and 77 PWR's. One additional PWR is expected to discharge spent fuel in the future.

The license expiration date and the electric utility's projected retirement date are generally the same for each reactor. All reactors that have shut down to date have done so before their license expiration dates. Some have shut down permanently and relinquished the operating licenses granted by the Nuclear Regulatory Commission. These are referred to as "retired" reactors. Others have shut down but have not surrendered their licenses. These reactors are in a "shut down mode."

The next operating reactor projected to retire is Consumer Power Company's Big Rock Point plant, with projected retirement in 2000 (Table 4, Figure 3). Starting in 2007, an increasing number of reactors are projected to retire, with a peak in retirements expected in 2013. The last U.S. operating reactor is projected to retire in 2037. These dates may change in the future as utilities rerack existing spent fuel storage pools, expand their storage capacities through licensed dry storage facilities, ship spent fuel to away-from-reactor storage facilities, and modify fuel cycle management programs.

Additional storage capacity is projected to be needed when a current storage facility is filled to capacity, based on an understanding of current storage conditions. For purposes of the Form RW-859 "filled

to capacity” refers to the loss of ability to discharge spent fuel. EIA collects data based on current storage plans for each commercial reactor for spent fuel storage. A reactor’s “loss of ability to operate” date is defined as the estimated date in which a utility would not continue reactor operation because of a lack of storage space for discharged fuel absent spent fuel pickup by DOE.

In 1995, two reactors (Prairie Island 1 & 2) were projected to reach a "loss of ability to operate" status (Table 4, Figure 4). So that the utility would continue to operate, an Independent Spent Fuel Storage Installation has been constructed at the reactors' site. In 2003, the number of reactors projected to lose the ability to operate increases to 10. The trend is expected to continue throughout the early part of the century with the last operational reactor projected to lose the ability to operate in 2028.

Table 1. Spent Fuel Discharges in 1994

Electric Utility Name	Reactor Name	Reactor Type	Reactor ID	All Discharged Assemblies		Temporarily Discharged Assemblies ^a		1994 Reactor Cycle Shutdown Date
				Assemblies	Initial Uranium Content (MTU)	Assemblies	Initial Uranium Content (MTU)	
Alabama Power Company	Farley 1	PWR	0101	61	28.3	0	0.0	Mar. 04
Arizona Public Service Company	Palo Verde 3	PWR	0303	124	51.6	0	0.0	Mar. 19
Arkansas Power and Light Company	Arkansas Nuclear 2	PWR	0402	73	29.8	0	0.0	Mar. 11
Baltimore Gas and Electric Company	Calvert Cliffs 1	PWR	0501	89	33.3	0	0.0	Feb. 09
Carolina Power and Light Company	Brunswick 2	BWR	0702	152	27.5	0	0.0	Mar. 26
	Harris 1	PWR	0703	61	26.1	0	0.0	Mar. 19
Cleveland Electric Illuminating Company	Perry 1	BWR	0901	228	40.8	0	0.0	Feb. 05
Commonwealth Edison Company	Braidwood 1	PWR	1001	92	39.0	0	0.0	Mar. 04
	Braidwood 2	PWR	1002	92	39.1	0	0.0	Oct. 08
	Byron 1	PWR	1003	92	39.0	0	0.0	Sep. 08
	Dresden 3	BWR	1007	180	30.5	0	0.0	Mar. 10
	LaSalle County 1	BWR	1008	208	38.4	0	0.0	Feb. 18
	Quad Cities 1	BWR	1010	144	25.2	0	0.0	Mar. 13
Consumers Power Company	Big Rock Point	BWR	1201	20	2.6	1	0.1	Sep. 30
Duke Power Company	Catawba 2	PWR	1502	88	37.4	0	0.0	Apr. 29
	McGuire 1	PWR	1504	72	31.1	0	0.0	Aug. 19
	McGuire 2	PWR	1505	76	33.2	0	0.0	Nov. 24
	Oconee 1	PWR	1506	60	27.8	0	0.0	Apr. 28
	Oconee 2	PWR	1507	60	27.8	0	0.0	Oct. 06
Florida Power Corporation	Crystal River 3	PWR	1701	72	33.4	0	0.0	Apr. 07

See footnotes at end of table.

Table 1. Spent Fuel Discharges in 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Reactor ID	All Discharged Assemblies		Temporarily Discharged Assemblies ^a		1994 Reactor Cycle Shutdown Date
				Assemblies	Initial Uranium Content (MTU)	Assemblies	Initial Uranium Content (MTU)	
Florida Power and Light Company	St. Lucie 1	PWR	1801	84	32.2	0	0.0	Oct. 26
	St. Lucie 2	PWR	1802	80	30.2	0	0.0	Feb. 14
	Turkey Point 3	PWR	1803	52	24.0	0	0.0	Apr. 04
	Turkey Point 4	PWR	1804	52	24.0	0	0.0	Oct. 02
Georgia Power Company	Hatch 1	BWR	2001	180	32.4	0	0.0	Sep. 21
	Hatch 2	BWR	2002	309	56.6	0	0.0	Mar. 16
	Vogtle 1	PWR	2003	93	40.9	0	0.0	Sep. 11
GPU Nuclear Corporation	Oyster Creek	BWR	1903	172	29.6	0	0.0	Sep. 15
Gulf States Utilities Company	River Bend 1	BWR	2101	193	34.5	0	0.0	Apr. 15
Indiana Michigan Power Company	Cook 1	PWR	5801	80	36.9	0	0.0	Feb. 12
	Cook 2	PWR	5802	76	31.4	0	0.0	Sep. 06
Kansas Gas and Electric Company	Wolf Creek 1	PWR	2501	80	37.1	0	0.0	Sep. 16
Louisiana Power and Light Company	Waterford 3	PWR	2701	93	38.0	0	0.0	Mar. 04
New York Power Authority	FitzPatrick	BWR	3901	204	36.7	0	0.0	Nov. 28
North Atlantic Energy Service Corporation	Seabrook	PWR	5901	72	33.3	0	0.0	Mar. 26
Northeast Utilities Service Company	Millstone 1	BWR	3201	188	33.3	0	0.0	Jan. 15
	Millstone 2	PWR	3202	84	31.7	0	0.0	Oct. 01
Northern States Power Company	Monticello	BWR	3301	112	19.4	0	0.0	Sep. 15
	Prairie Island 1	PWR	3302	49	17.5	0	0.0	May 08
Pacific Gas and Electric Company	Diablo Canyon 1	PWR	3501	88	37.4	0	0.0	Mar. 12
	Diablo Canyon 2	PWR	3502	88	37.4	0	0.0	Sep. 24
PECO Energy Company	Limerick 1	BWR	3701	340	61.3	0	0.0	Feb. 04
	Peach Bottom 2	BWR	3704	272	48.6	0	0.0	Sep. 16
Pennsylvania Power and Light Company	Susquehanna 2	BWR	3602	248	42.8	0	0.0	Mar. 12
Public Service Electric and Gas Company	Hope Creek	BWR	4201	232	42.9	0	0.0	Mar. 05
	Salem 2	PWR	4203	69	31.9	4	1.9	Oct. 13
Rochester Gas and Electric Corporation	Ginna	PWR	4401	32	11.3	0	0.0	Mar. 04
South Carolina Electric and Gas Company	Summer	PWR	4601	64	26.9	0	0.0	Sep. 09

See footnotes at end of table.

Table 1. Spent Fuel Discharges in 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Reactor ID	All Discharged Assemblies		Temporarily Discharged Assemblies ^a		1994 Reactor Cycle Shutdown Date
				Assemblies	Initial Uranium Content (MTU)	Assemblies	Initial Uranium Content (MTU)	
Tennessee Valley Authority	Browns Ferry 2	BWR	4804	324	58.8	80	14.2	Oct. 01
	Sequoyah 2	PWR	4809	94	43.6	0	0.0	Jul. 04
Toledo Edison Company	Davis-Besse	PWR	5001	69	32.3	0	0.0	Oct. 01
TU Electric	Comanche Peak 2	PWR	4902	88	37.6	0	0.0	Oct. 06
Virginia Power	North Anna 1	PWR	5201	81	37.5	4	1.8	Sep. 09
	Surry 1	PWR	5203	61	28.2	4	1.8	Jan. 22
Washington Public Power Supply System	Washington Nuclear 2	BWR	5302	156	27.5	0	0.0	May 01
Wisconsin Electric Power Company	Point Beach 1	PWR	5401	29	10.4	0	0.0	Apr. 02
	Point Beach 2	PWR	5402	29	10.4	0	0.0	Sep. 24
Wisconsin Public Service Corporation	Kewaunee	PWR	5501	41	15.6	4	1.5	Apr. 02
Total BWR				3,862	689.3	81	14.3	
Total PWR				2,840	1,214.6	16	7.0	
Total				6,702	1,903.8	97	21.4	

^aValues are included in All Discharged Assemblies columns.

MTU = Metric tons of uranium; PWR = Pressurized-water reactor; BWR = Boiling-water reactor.

Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 2. Reactor Spent Fuel Discharge and Storage Activity for 1994

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	1993 Assembly Total	1994 Assembly Discharges	1994 Assembly Reinsertions	Other	1994 Assembly Total
Alabama Power Company	Farley 1	PWR	0101	655	61			716
	Farley 2	PWR	0102	558				558
Arizona Public Service Company	Palo Verde 1	PWR	0301	368				368
	Palo Verde 2	PWR	0302	384				384
	Palo Verde 3	PWR	0303	284	124	28		380
Arkansas Power and Light Company	Arkansas Nuclear 1	PWR	0401	684				684
	Arkansas Nuclear 2	PWR	0402	564	73	1		636
Baltimore Gas and Electric Company	Calvert Cliffs 1	PWR	0501	1,450	89	1	^a -122	1,394
	Calvert Cliffs 2	PWR		0			^a -22	
	Dry Storage	PWR	0501D	48			^a 144	192
Boston Edison Company	Pilgrim 1	BWR	0601	1,628				1,628
Carolina Power and Light Company	Brunswick 1	BWR	0701	1,146			^b -204	942
	Brunswick 1	PWR	0701	160				160
	Brunswick 2	BWR	0702	841	152		^b -102	891
	Brunswick 2	PWR	0702	144				144
	Harris 1	PWR	0703	448	61	9		500
	Harris 1	BWR	0703	753			^b 306	1,059
	Robinson 2	PWR	0705	240				240
	Dry Storage	PWR	0705D	56				56
Cleveland Electric Illuminating Company	Perry 1	BWR	0901	748	228	4		972
		BWR	0902					
Commonwealth Edison Company	Braidwood 1	PWR	1001	488	92			668
	Braidwood 2	PWR			92	4		
	Byron 1	PWR	1003	772	92			864
	Byron 2	PWR						
	Dresden 1	BWR	1005	683				683
	Dresden 2	BWR	1006	2,162				2,162
	Dresden 3	BWR	1007	1,968	180			2,148
	LaSalle County 1	BWR	1008	2,152	208			2,360
	LaSalle County 2	BWR		0				
	Quad Cities 1	BWR	1010	4,140	144			4,284
	Quad Cities 2	BWR		0				
	Zion 1	PWR	1012	1,684				1,684
	Zion 2	PWR						

Table 2. Reactor Spent Fuel Discharge and Storage Activity for 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	1993 Assembly Total	1994 Assembly Discharges	1994 Assembly Reinsertions	Other	1994 Assembly Total
Consolidated Edison Company of New York	Indian Point 1	PWR	1101	160				160
	Indian Point 2	PWR	1102	756				756
Consumers Power Company	Big Rock Point	BWR	1201	316	20			336
	Palisades	PWR	1204	745				745
	Dry Storage	PWR	1204D	48				48
Dairyland Power Cooperative	LaCrosse	BWR	1301	333				333
Detroit Edison Company	Enrico Fermi 2	BWR	1402	900				900
Duke Power Company	Catawba 1	PWR	1501	484				484
	Catawba 2	PWR	1502	356	88			444
	McGuire 1	PWR	1504	583	72	4		651
	McGuire 2	PWR	1505	817	76			893
	Oconee 1	PWR	1506	1,026	60		c-63	1,026
	Oconee 2	PWR			60		c-57	
	Oconee 3	PWR	1508	528				528
	Dry Storage	PWR	1506D	576			c-120	696
Duquesne Light Company	Beaver Valley 1	PWR	1601	576				576
	Beaver Valley 2	PWR	1602	260				260
Florida Power Corporation	Crystal River 3	PWR	1701	536	72			608
Florida Power and Light Company	St. Lucie 1	PWR	1801	880	84			964
	St. Lucie 2	PWR	1802	464	80			544
	Turkey Point 3	PWR	1803	588	52			640
	Turkey Point 4	PWR	1804	598	52			650
Georgia Power Company	Hatch 1	BWR	2001	3,544	180			3,919
	Hatch 2	BWR		0	309	114		
	Vogtle 1	PWR	2003	565	93	12		646
	Vogtle 2	PWR		0				
GPU Nuclear Corporation	Three Mile Island 1	PWR	1901	601				601
	Oyster Creek	BWR	1903	1,876	172			2,048
Gulf States Utilities Company	River Bend 1	BWR	2101	764	193	1		956
Houston Lighting and Power Company	South Texas 1	PWR	2201	236				236
	South Texas 2	PWR	2202	188				188

See footnotes at end of table.

Table 2. Reactor Spent Fuel Discharge and Storage Activity for 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	1993 Assembly Total	1994 Assembly Discharges	1994 Assembly Reinsertions	Other	1994 Assembly Total
IES Utilities, Inc.	Duane Arnold	BWR	2401	1,280				1,280
Illinois Power Company	Clinton 1	BWR	2301	724				724
Indiana Michigan Power Company	Cook 1	PWR	5801	1,523	80			1,679
	Cook 2	PWR			76			
Kansas Gas and Electric Company	Wolf Creek 1	PWR	2501	408	80			488
Long Island Power Authority	Shoreham	BWR	2601	254			^d -254	0
Louisiana Power and Light Company	Waterford 3	PWR	2701	428	93	1		520
Maine Yankee Atomic Power Company	Maine Yankee	PWR	2801	1,149				1,149
Nebraska Public Power District	Cooper Station	BWR	3001	804				804
New York Power Authority	FitzPatrick	BWR	3901	1,684	204			1,888
	Indian Point 3	PWR	3902	584				584
Niagara Mohawk Power Corporation	Nine Mile Point 1	BWR	3101	1,812				1,812
	Nine Mile Point 2	BWR	3102	640				640
North Atlantic Energy Service Corporation	Seabrook	PWR	5901	136	72			208
Northeast Utilities Service Company	Millstone 1	BWR	3201	2,116	188			2,304
	Millstone 2	PWR	3202	784	84			868
	Millstone 3	PWR	3203	332				332
	Haddam Neck	PWR	5701	809				809
Northern States Power Company	Monticello	BWR	3301	710	112			822
	Prairie Island 1	PWR	3302	1,281	49	1		1,329
	Prairie Island 2	PWR						
Omaha Public Power District	Fort Calhoun	PWR	3401	570				570

See footnotes at end of table.

Table 2. Reactor Spent Fuel Discharge and Storage Activity for 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	1993 Assembly Total	1994 Assembly Discharges	1994 Assembly Reinsertions	Other	1994 Assembly Total
Pacific Gas and Electric Company	Diablo Canyon 1	PWR	3501	376	88			464
	Diablo Canyon 2	PWR	3502	396	88			484
	Humboldt Bay	BWR	3503	390				390
PECO Energy Company	Limerick 1	BWR	3701	1,954	340	56	^d 254	2,492
	Limerick 2	BWR		0				
	Peach Bottom 2	BWR	3704	2,162	272			2,434
	Peach Bottom 3	BWR	3705	2,200				2,200
Pennsylvania Power and Light Company	Susquehanna 1	BWR	3601	2,864				3,112
	Susquehanna 2	BWR		0	248			
Portland General Electric Company	Trojan	PWR	3801	780				780
Public Service Electric and Gas Company	Hope Creek	BWR	4201	1,008	232			1,240
	Salem 1	PWR	4202	708				708
	Salem 2	PWR	4203	492	69	5		556
Rochester Gas and Electric Corporation	Ginna	PWR	4401	689	32			721
Sacramento Municipal Utility District	Rancho Seco	PWR	4501	493				493
South Carolina Electric and Gas Company	Summer	PWR	4601	440	64			504
Southern California Edison Company	San Onofre 1	PWR	4701	207				207
	San Onofre 2	PWR	4702	662				662
	San Onofre 3	PWR	4703	710				710
System Energy Resources, Inc.	Grand Gulf 1	BWR	2901	1,660				1,660
Tennessee Valley Authority	Browns Ferry 1	BWR	4803	3,316				3,560
	Browns Ferry 2	BWR		0	324	80		
	Browns Ferry 3	BWR	4805	1,030				1,030
	Sequoyah 1	PWR	4808	817				901
	Sequoyah 2	PWR			94	10		
	Watts Bar 1	PWR	4810	0				0
Toledo Edison Company	Davis-Besse	PWR	5001	456	69	5		520

See footnotes at end of table.

Table 2. Reactor Spent Fuel Discharge and Storage Activity for 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	1993 Assembly Total	1994 Assembly Discharges	1994 Assembly Reinsertions	Other	1994 Assembly Total
TU Electric	Comanche Peak 1	PWR	4901	205				293
	Comanche Peak 2	PWR		0	88			
Union Electric Company	Callaway	PWR	5101	548				548
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	BWR	6001	1,978				1,978
Virginia Power	North Anna 1	PWR	5201	1,125	81	17		1,189
	North Anna 2	PWR						
	Surry 1	PWR	5203	856	61	1	^e -63	799
	Surry 2	PWR					^e -54	
	Dry Storage	PWR	5203D	416			^e 117	533
Washington Public Power Supply System	Washington Nuclear 2	BWR	5302	1,040	156			1,196
Wisconsin Electric Power Company	Point Beach 1	PWR	5401	1,249	29	1		1,306
	Point Beach 2	PWR			29			
Wisconsin Public Service Corporation	Kewaunee	PWR	5501	652	41	5		688
Yankee Atomic Electric Company	Yankee Rowe	PWR	5601	533				533
Total BWR				53,580	3,862	255	0	57,187
Total PWR				41,372	2,840	105	0	44,107
Total (Nuclear Power Plant Sites Only)				94,952	6,702	360	0	101,294
Away-from-reactor Storage Facilities (From Table 11)				3,448	--	--	--	3,448
Total (Including Away-from-reactor Storage Facilities)				98,400	6,702	360	0	104,742

^aTransfer of 144 assemblies from Calvert Cliffs storage pools to Calvert Cliffs dry storage.

^bTransfer of 306 assemblies from Brunswick storage pools to Harris 1 storage pools.

^cTransfer of 120 assemblies from Oconee storage pools to Oconee dry storage.

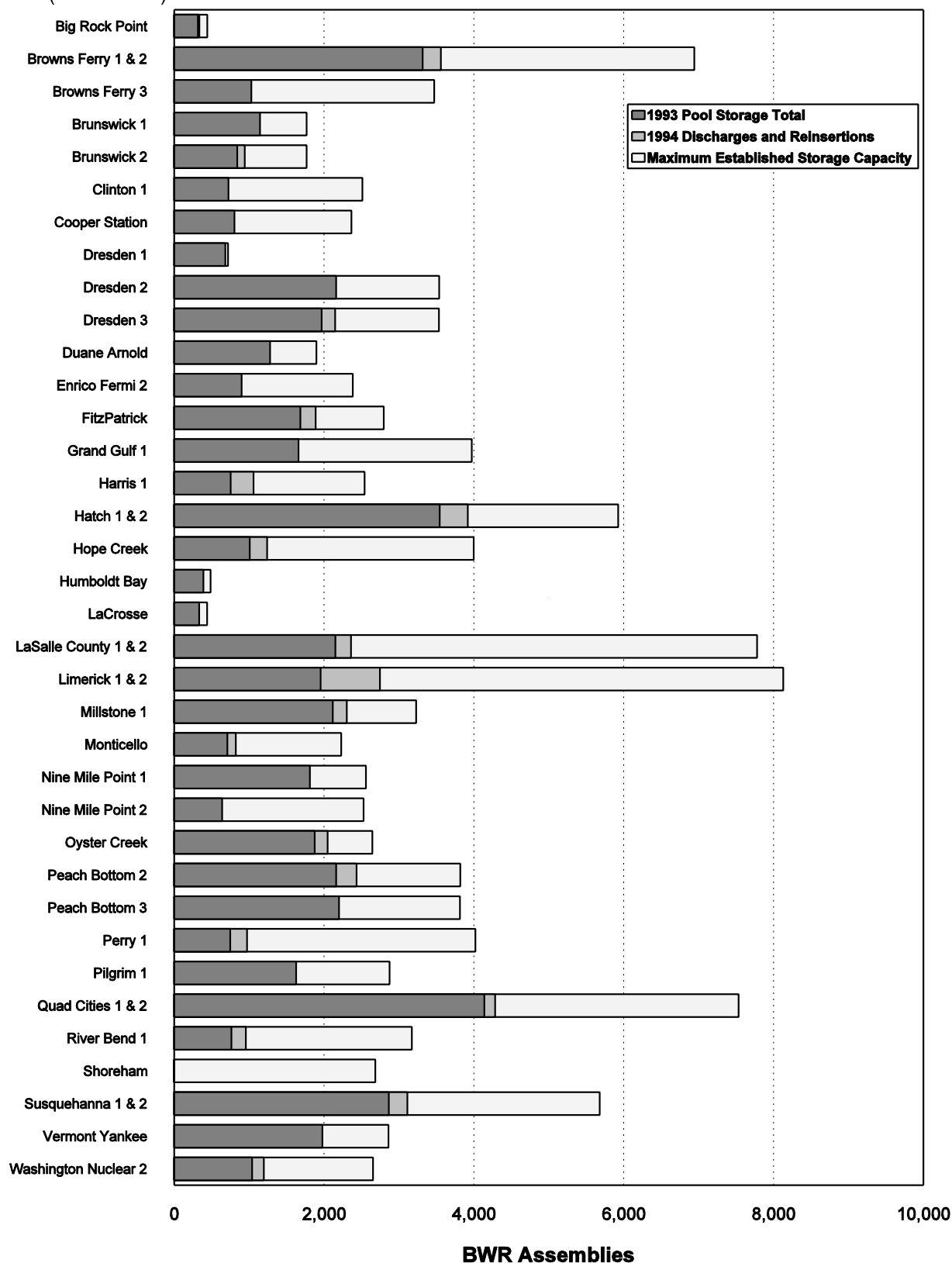
^dTotal of 254 assemblies shipped from Long Island Power Authority's Shoreham plant to PECO Energy Company's Limerick 1 plant. See Technical Note 14 in Appendix E.

^eTransfer of 117 assemblies from Surry storage pools to Surry dry storage.

PWR = Pressurized-water reactor; BWR = Boiling-water reactor; -- = Not applicable.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

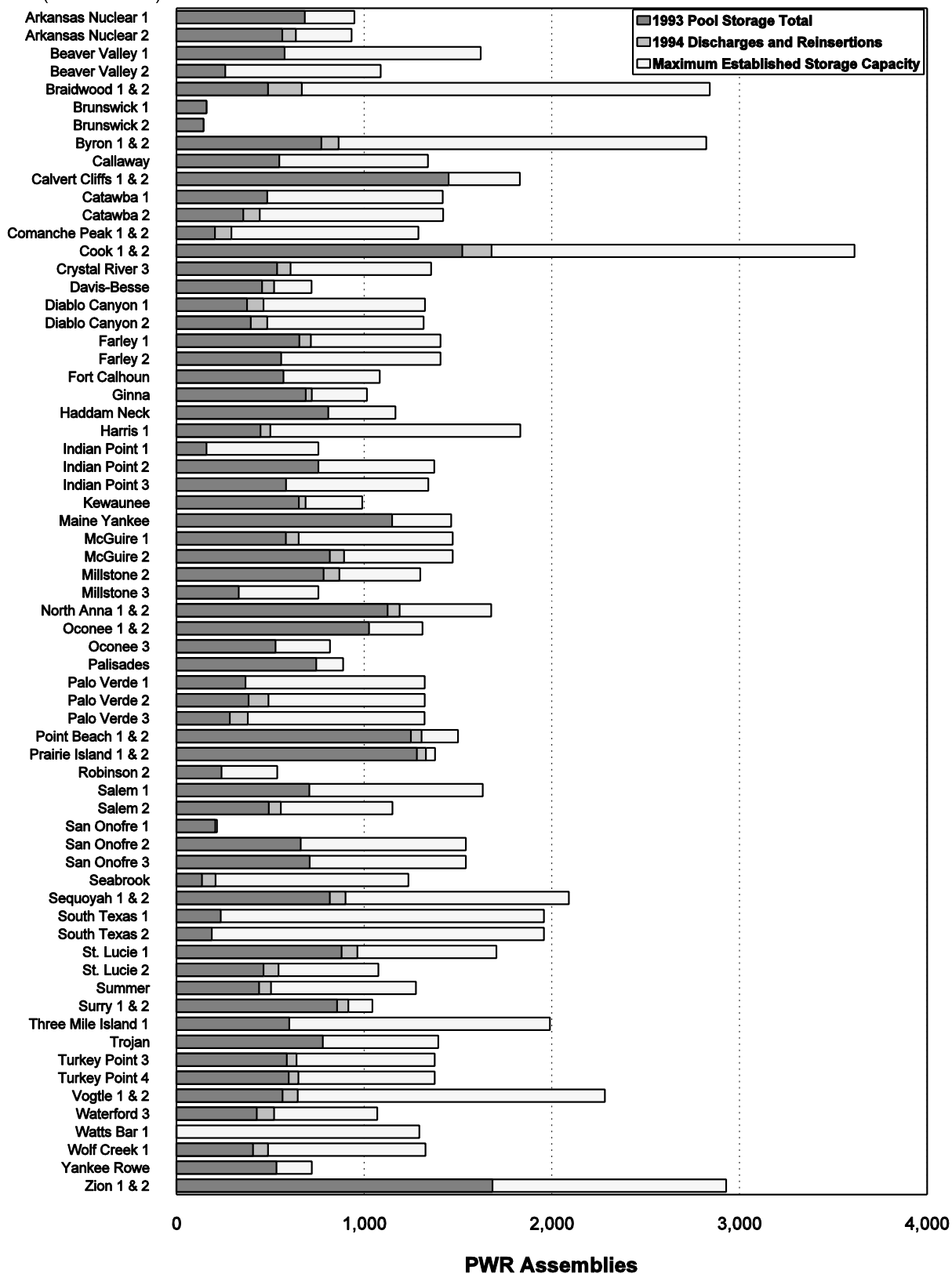
**Figure 1. Pool Capacities and Inventories for Boiling-Water Reactors
(Assemblies)**



Notes: Data includes all boiling-water reactors (BWR's) reported on the Form RW-859. Number of 1994 Discharges and Reinsertions does not include intrautility transfers. See Table 2. Values of 1994 Discharges and Reinsertions for Limerick 1 & 2 and Shoreham reflect the transfer of 254 assemblies from Shoreham to Limerick 1 in 1994. See Technical Note 14 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Figure 2. Pool Capacities and Inventories for Pressurized-Water Reactors
(Assemblies)



Notes: Data includes all pressurized-water reactors (PWR's) reported on the Form RW-859. Number of 1994 Discharges and Reinsertions does not include intrautility transfers. See Table 2.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 3. Temporarily Discharged Assemblies

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Temporarily Discharged Assemblies		
				Through 1994	Through 1993	Increase/Reduction
Arizona Public Service Company	Palo Verde 3	PWR	0303	1	1	0
Carolina Power and Light Company	Brunswick 1	BWR	0701	1	1	0
Cleveland Electric Illuminating Company	Perry 1	BWR	0901	0	4	-4
Consolidated Edison Company of New York	Indian Point 2	PWR	1102	8	8	0
Consumers Power Company	Big Rock Point	BWR	1201	1	0	1
	Palisades	PWR	1204	1	1	0
Detroit Edison Company	Enrico Fermi 2	BWR	1402	40	40	0
Duquesne Light Company	Beaver Valley 1	PWR	1601	13	13	0
Florida Power Corporation	Crystal River 3	PWR	1701	5	5	0
GPU Nuclear Corporation	Three Mile Island 1	PWR	1901	23	23	0
Houston Lighting and Power Company	South Texas 1	PWR	2201	7	7	0
Maine Yankee Atomic Power Company	Maine Yankee	PWR	2801	18	18	0
New York Power Authority	Indian Point 3	PWR	3902	2	2	0
PECO Energy Company	Limerick 1	BWR	3701	^a 504	306	198
Public Service Electric and Gas Company	Salem 1	PWR	4202	23	23	0
	Salem 2	PWR	4203	34	35	-1
Tennessee Valley Authority	Browns Ferry 2	BWR	4803	80	80	0
Toledo Edison Company	Davis-Besse	PWR	5001	2	6	-4
Union Electric Company	Callaway	PWR	5101	2	2	0
Virginia Power	North Anna 1	PWR	5201	19	25	-6
	Surry 1	PWR	5203	10	6	4
Wisconsin Public Service Corporation	Kewaunee	PWR	5501	4	4	0
Total				798	610	188

^aA total of 560 temporarily discharged assemblies were shipped from Long Island Power Authority's Shoreham plant to Limerick 1. Of these, a total of 56 temporarily discharged assemblies were reinserted in core at Limerick 1. See Technical Note 14 in Appendix E.

PWR = Pressurized-water reactor; BWR = Boiling-water reactor.

Note: Changes in number of temporarily discharged assemblies are due to discharge of additional temporarily discharged assemblies, reinsertion of previously discharged assemblies, and/or change in status of previously discharged assemblies.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 4. Nuclear Power Plant Data as of December 31, 1994

Electric Utility Name	Reactor Name	State	Reactor Type	Vendor ^a	Capacity (net MWe) ^b	Core Size (number of assemblies)	Date of Operation (year) ^c	License Expiration (year)	Loss of Ability to Operate (year) ^d	Actual or Projected Retirement (year)
Alabama Power Company	Farley 1	AL	PWR	WE	815	157	1977	2017	2010	2017
	Farley 2	AL	PWR	WE	825	157	1981	2021	2013	2021
Arizona Public Service Company	Palo Verde 1	AZ	PWR	CE	1,270	241	1985	2024	2005	2024
	Palo Verde 2	AZ	PWR	CE	1,270	241	1986	2025	2005	2025
	Palo Verde 3	AZ	PWR	CE	1,270	241	1987	2027	2006	2027
Arkansas Power and Light Company	Arkansas Nuclear 1	AR	PWR	B&W	836	177	1974	2014	1996	2014
	Arkansas Nuclear 2	AR	PWR	CE	858	177	1978	2018	1997	2018
Baltimore Gas and Electric Company	Calvert Cliffs 1	MD	PWR	CE	835	217	1974	2014	2007	2014
	Calvert Cliffs 2	MD	PWR	CE	840	217	1976	2016	2007	2016
Boston Edison Company	Pilgrim 1	MA	BWR	GE	665	580	1972	2012	2003	2012
Carolina Power and Light Company	Brunswick 1	NC	BWR	GE	767	560	1976	2016	2002	2016
	Brunswick 2	NC	BWR	GE	754	560	1974	2014	2003	2014
	Harris 1	NC	PWR	WE	860	157	1987	2026	2026	2026
	Robinson 2	SC	PWR	WE	683	157	1970	2010	2004	2010
Cleveland Electric Illuminating Company	Perry 1	OH	BWR	GE	1,169	748	1986	2026	2013	2026
Commonwealth Edison Company	Braidwood 1	IL	PWR	WE	1,090	193	1987	2026	2012	2028
	Braidwood 2	IL	PWR	WE	1,090	193	1988	2027	2012	2028
	Byron 1	IL	PWR	WE	1,120	193	1985	2024	2011	2025
	Byron 2	IL	PWR	WE	1,120	193	1987	2026	2011	2027
	Dresden 1	IL	BWR	GE	200	464	1959	1996	SD	1984
	Dresden 2	IL	BWR	GE	772	724	1969	2006	2001	2010
	Dresden 3	IL	BWR	GE	773	724	1971	2011	2002	2013
	LaSalle County 1	IL	BWR	GE	1,048	764	1982	2022	2013	2024
	LaSalle County 2	IL	BWR	GE	1,048	764	1984	2023	2013	2024
	Quad Cities 1	IL	BWR	GE	769	724	1972	2012	2009	2013
	Quad Cities 2	IL	BWR	GE	769	724	1972	2012	2009	2013
	Zion 1	IL	PWR	WE	1,040	193	1973	2013	2006	2013
	Zion 2	IL	PWR	WE	1,040	193	1973	2013	2006	2014

See footnotes at end of table.

Table 4. Nuclear Power Plant Data as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	State	Reactor Type	Vendor ^a	Capacity (net MWe) ^b	Core Size (number of assemblies)	Date of Operation (year) ^c	License Expiration (year)	Loss of Ability to Operate (year) ^d	Actual or Projected Retirement (year)
Consolidated Edison Company of New York	Indian Point 1	NY	PWR	B&W	265	120	1962	1980	RD	1980
	Indian Point 2	NY	PWR	WE	931	193	1973	2013	2003	2013
Consumers Power Company	Big Rock Point	MI	BWR	GE	67	84	1962	2000	2000	2000
	Palisades	MI	PWR	CE	755	204	1972	2007	2007	2011
Dairyland Power Cooperative	LaCrosse	WI	BWR	AC	50	72	1967	2031	RD	1987
Detroit Edison Company	Enrico Fermi 2	MI	BWR	GE	1,085	764	1985	2025	2006	2025
Duke Power Company	Catawba 1	SC	PWR	WE	1,129	193	1985	2024	2003	2025
	Catawba 2	SC	PWR	WE	1,129	193	1986	2026	2007	2026
	McGuire 1	NC	PWR	WE	1,129	193	1981	2021	2004	2021
	McGuire 2	NC	PWR	WE	1,129	193	1983	2023	2002	2023
	Oconee 1	SC	PWR	B&W	846	177	1973	2013	2010	2013
	Oconee 2	SC	PWR	B&W	846	177	1973	2013	2010	2013
	Oconee 3	SC	PWR	B&W	846	177	1974	2014	2011	2014
Duquesne Light Company	Beaver Valley 1	PA	PWR	WE	810	157	1976	2016	2012	2016
	Beaver Valley 2	PA	PWR	WE	820	157	1987	2027	2011	2027
Florida Power Corporation	Crystal River 3	FL	PWR	B&W	812	177	1977	2016	2010	2016
Florida Power and Light Company	St. Lucie 1	FL	PWR	CE	839	217	1976	2016	2007	2016
	St. Lucie 2	FL	PWR	CE	839	217	1983	2023	2001	2023
	Turkey Point 3	FL	PWR	WE	666	157	1972	2012	2012	2012
	Turkey Point 4	FL	PWR	WE	666	157	1973	2013	2013	2013
Georgia Power Company	Hatch 1	GA	BWR	GE	744	560	1974	2014	2003	2014
	Hatch 2	GA	BWR	GE	768	560	1978	2018	2003	2018
	Vogtle 1	GA	PWR	WE	1,164	193	1987	2027	2010	2027
	Vogtle 2	GA	PWR	WE	1,164	193	1989	2029	2010	2029
GPU Nuclear Corporation	Three Mile Island 1	PA	PWR	B&W	786	177	1974	2014	2014	2014
	Oyster Creek	NJ	BWR	GE	619	560	1969	2009	2000	2009

See footnotes at end of table.

Table 4. Nuclear Power Plant Data as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	State	Reactor Type	Vendor ^a	Capacity (net MWe) ^b	Core Size (number of assemblies)	Date of Operation (year) ^c	License Expiration (year)	Loss of Ability to Operate (year) ^d	Actual or Projected Retirement (year)
Gulf States Utilities Company	River Bend 1	LA	BWR	GE	931	624	1985	2025	2003	2025
Houston Lighting and Power Company	South Texas 1	TX	PWR	WE	1,241	193	1988	2027	2027	2027
	South Texas 2	TX	PWR	WE	1,241	193	1989	2028	2028	2028
IES Utilities, Inc.	Duane Arnold	IA	BWR	GE	515	368	1974	2014	1998	2014
Illinois Power Company	Clinton 1	IL	BWR	GE	930	624	1987	2026	2008	2026
Indiana Michigan Power Company	Cook 1	MI	PWR	WE	1,000	193	1974	2014	2011	2014
	Cook 2	MI	PWR	WE	1,060	193	1977	2017	2011	2017
Kansas Gas and Electric Company	Wolf Creek 1	KS	PWR	WE	1,160	193	1985	2025	2006	2025
Long Island Power Authority	Shoreham	NY	BWR	GE	849	560	1985	2013	SD	1987
Louisiana Power and Light Company	Waterford 3	LA	PWR	CE	1,075	217	1985	2024	2000	2024
Maine Yankee Atomic Power Company	Maine Yankee	ME	PWR	CE	870	217	1973	2008	1999	2008
Nebraska Public Power District	Cooper Station	NE	BWR	GE	778	548	1974	2014	2002	2014
New York Power Authority	FitzPatrick	NY	BWR	GE	800	560	1974	2014	2003	2014
	Indian Point 3	NY	PWR	WE	980	193	1976	2015	2006	2015
Niagara Mohawk Power Corporation	Nine Mile Point 1	NY	BWR	GE	605	532	1969	2009	2005	2008
	Nine Mile Point 2	NY	BWR	GE	1,045	764	1987	2026	2017	2026
North Atlantic Energy Service Corporation	Seabrook	NH	PWR	WE	1,150	193	1990	2026	2012	2030

See footnotes at end of table.

Table 4. Nuclear Power Plant Data as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	State	Reactor Type	Vendor ^a	Capacity (net MWe) ^b	Core Size (number of assemblies)	Date of Operation (year) ^c	License Expiration (year)	Loss of Ability to Operate (year) ^d	Actual or Projected Retirement (year)
Northeast Utilities Service Company	Millstone 1	CT	BWR	GE	641	580	1970	2010	2003	2010
	Millstone 2	CT	PWR	CE	873	217	1975	2015	2006	2015
	Millstone 3	CT	PWR	WE	1,120	193	1986	2025	2005	2025
	Haddam Neck	CT	PWR	WE	560	157	1967	2007	2004	2007
Northern States Power Company	Monticello	MN	BWR	GE	539	484	1971	2010	2004	2010
	Prairie Island 1	MN	PWR	WE	513	121	1974	2013	1995	2013
	Prairie Island 2	MN	PWR	WE	512	121	1974	2014	1995	2014
Omaha Public Power District	Fort Calhoun	NE	PWR	CE	476	133	1973	2013	2007	2013
Pacific Gas and Electric Company	Diablo Canyon 1	CA	PWR	WE	1,073	193	1984	2021	2008	2021
	Diablo Canyon 2	CA	PWR	WE	1,087	193	1985	2025	2007	2025
	Humboldt Bay	CA	BWR	GE	65	184	1962	2015	SD	1976
PECO Energy Company	Limerick 1	PA	BWR	GE	1,055	764	1985	2024	2008	2024
	Limerick 2	PA	BWR	GE	1,055	764	1989	2029	1998	2029
	Peach Bottom 2	PA	BWR	GE	1,093	764	1973	2013	2000	2013
	Peach Bottom 3	PA	BWR	GE	1,035	764	1974	2008	1999	2008
Pennsylvania Power and Light Company	Susquehanna 1	PA	BWR	GE	1,040	764	1982	2022	2001	2022
	Susquehanna 2	PA	BWR	GE	1,094	764	1984	2024	2001	2024
Portland General Electric Company	Trojan	OR	PWR	WE	1,130	193	1975	2011	SD	1992
Public Service Electric and Gas Company	Hope Creek	NJ	BWR	GE	1,031	764	1986	2026	2012	2026
	Salem 1	NJ	PWR	WE	1,106	193	1976	2016	2014	2016
	Salem 2	NJ	PWR	WE	1,106	193	1981	2020	2008	2020
Rochester Gas and Electric Corporation	Ginna	NY	PWR	WE	470	121	1969	2009	2005	2009
Sacramento Municipal Utility District	Rancho Seco	CA	PWR	B&W	918	177	1974	2008	SD	1989

See footnotes at end of table.

Table 4. Nuclear Power Plant Data as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	State	Reactor Type	Vendor ^a	Capacity (net MWe) ^b	Core Size (number of assemblies)	Date of Operation (year) ^c	License Expiration (year)	Loss of Ability to Operate (year) ^d	Actual or Projected Retirement (year)
South Carolina Electric and Gas Company	Summer	SC	PWR	WE	885	157	1982	2022	2009	2035
Southern California Edison Company	San Onofre 1	CA	PWR	WE	436	157	1967	2004	SD	1992
	San Onofre 2	CA	PWR	CE	1,070	217	1982	2013	2005	2013
	San Onofre 3	CA	PWR	CE	1,080	217	1983	2013	2005	2013
System Energy Resources, Inc.	Grand Gulf 1	MS	BWR	GE	1,143	800	1984	2022	2005	2022
Tennessee Valley Authority	Browns Ferry 1	AL	BWR	GE	1,065	764	1973	2013	2011	2013
	Browns Ferry 2	AL	BWR	GE	1,065	764	1974	2014	2012	2014
	Browns Ferry 3	AL	BWR	GE	1,065	764	1976	2016	2009	2016
	Sequoyah 1	TN	PWR	WE	1,111	193	1980	2020	2004	2020
	Sequoyah 2	TN	PWR	WE	1,106	193	1981	2021	2005	2021
	Watts Bar 1	TN	PWR	WE	1,165	193	^e 1996	NA	2008	2035
Toledo Edison Company	Davis-Besse	OH	PWR	B&W	868	177	1977	2017	2017	2037
TU Electric	Comanche Peak 1	TX	PWR	WE	1,150	193	1990	2030	2002	2030
	Comanche Peak 2	TX	PWR	WE	1,150	193	1993	2033	2003	2033
Union Electric Company	Callaway	MO	PWR	WE	1,115	193	1984	2024	2007	2024
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	VT	BWR	GE	496	368	1973	2012	2004	2012
Virginia Power	North Anna 1	VA	PWR	WE	900	157	1978	2018	2000	2018
	North Anna 2	VA	PWR	WE	887	157	1980	2020	2001	2020
	Surry 1	VA	PWR	WE	781	157	1972	2012	2012	2012
	Surry 2	VA	PWR	WE	781	157	1973	2013	2013	2013
Washington Public Power Supply System	Washington Nuclear 2	WA	BWR	GE	1,086	764	1984	2023	1999	2023
Wisconsin Electric Power Company	Point Beach 1	WI	PWR	WE	492	121	1970	2010	2001	2010
	Point Beach 2	WI	PWR	WE	481	121	1973	2013	2002	2013

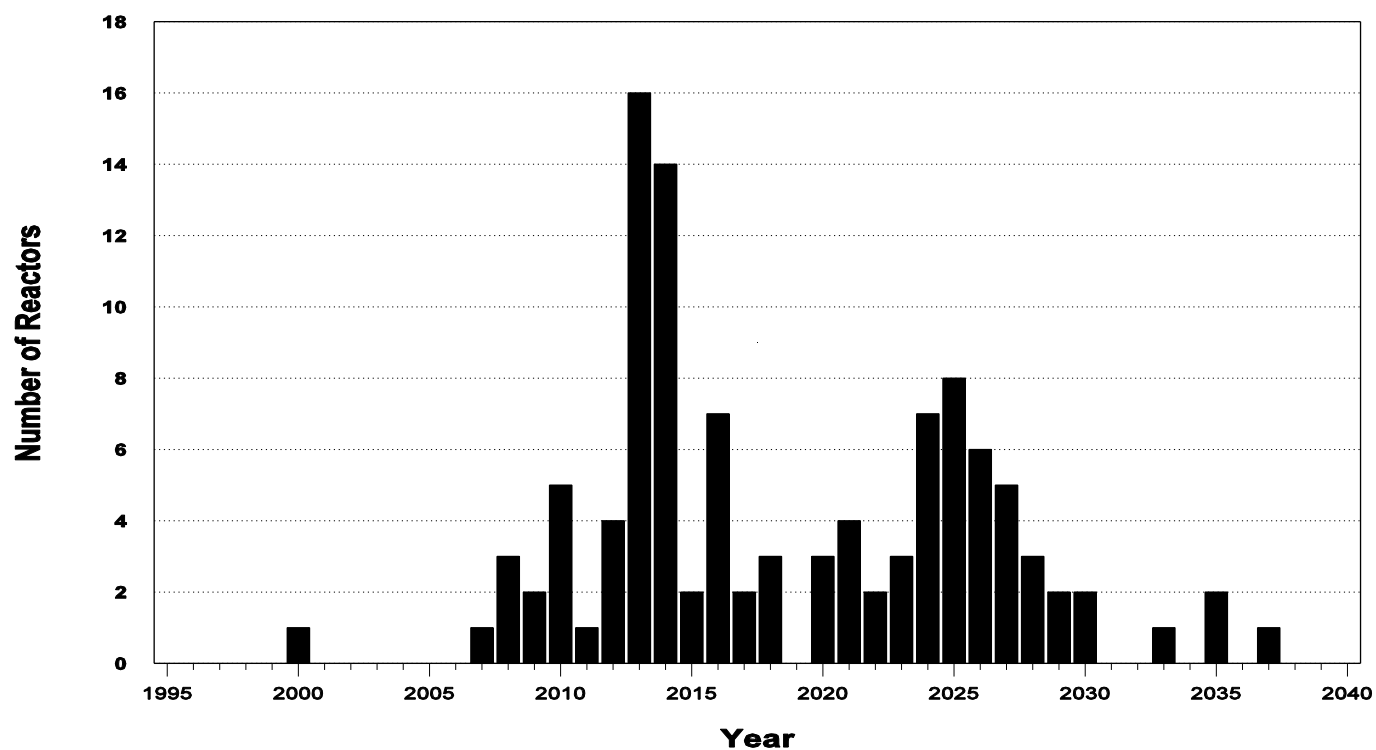
See footnotes at end of table.

Table 4. Nuclear Power Plant Data as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	State	Reactor Type	Vendor ^a	Capacity (net MWe) ^b	Core Size (number of assemblies)	Date of Operation (year) ^c	License Expiration (year)	Loss of Ability to Operate (year) ^d	Actual or Projected Retirement (year)
Wisconsin Public Service Corporation	Kewaunee	WI	PWR	WE	526	121	1973	2013	2004	2014
Yankee Atomic Electric Company	Yankee Rowe	MA	PWR	WE	175	76	1960	2000	SD	1992

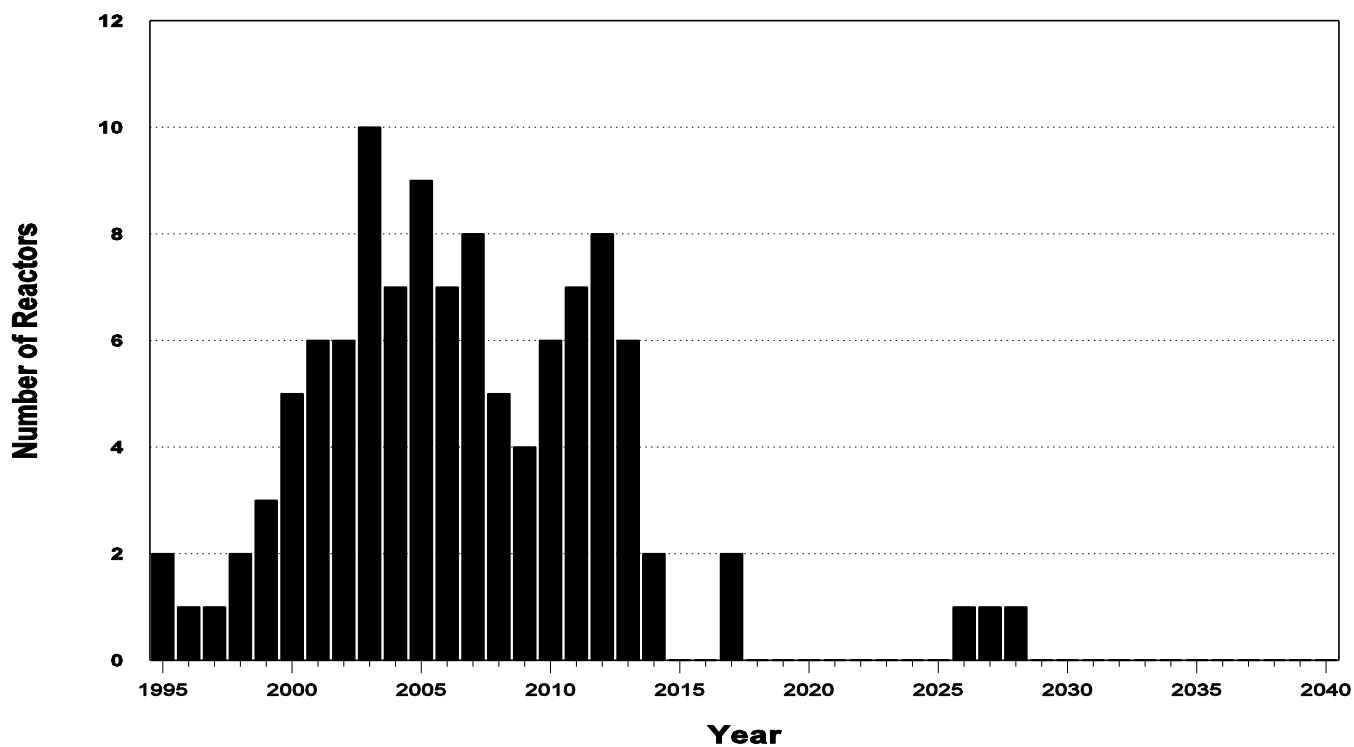
^aVendor codes are as follows: AC = Allis Chalmers; B&W = Babcock & Wilcox Company; CE = ABB Combustion Engineering; GE = GE Nuclear Energy; WE = Westinghouse.
^bCapacity (net MWe) data are not available on the Form RW-859 data base. Data for operating reactors are from Energy Information Administration, *World Nuclear Outlook 1995*, (October 1995), Table C1. Data for shut down and retired reactors are from historical Form RW-859 submissions.
^cDate of Operation is the date the unit received its full-power operating license.
^dThese data are compiled directly from question 2.3 on the Form RW-859. It reads as follows: "What is the estimated date on which you would not continue reactor operation, because of lack of storage space for discharged fuel absent spent fuel pickup by DOE?"
^eDate of Operation is not available for all reactors on Form RW-859 data base. Date of Operation for Watts Bar 1 is from Energy Information Administration, *World Nuclear Outlook 1995*, (October 1995), Table D1.
MWe = Megawatts electric; PWR = Pressurized-water reactor; BWR = Boiling-water reactor; SD = Shut down reactor; RD = Retired reactor; NA = Not available.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Figure 3. Projected Retirement Year Data as of December 31, 1994



Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Figure 4. Loss of Ability to Operate Data as of December 31, 1994



Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Annual Discharges and Burnup

A total of 104,742 spent nuclear fuel assemblies discharged through 1994 contained 30,003.3 MTU (Table 5, Figure 5). By weight, approximately 64 percent of the spent nuclear fuel came from PWR's and 36 percent from BWR's. In 1994, the number of PWR assemblies permanently discharged (2,824) represents a decrease from 3,531 in 1993. The number of BWR assemblies permanently discharged (3,781) represents a decrease from 3,883 in 1993.

Starting in 1970, the annual average burnup for all discharged BWR assemblies has shown a steady increase to the current level of 33.1 GWDt/MTU in 1994 (Table 5, Figure 6). Average burnups fluctuated between 1984 and 1990 because of the number of reactors discharging first and second cycle assemblies. The average burnup for all PWR assemblies has increased to 40.0 GWDt/MTU in 1994.

Some electric utilities report plans to continue increasing burnup. This is accomplished by increasing the concentration of U-235 in the enriched uranium product and changing the design specifications of the fuel rods to allow for longer incore exposures. Electric utilities use higher fuel burnup to increase cycle lengths and/or to reduce spent fuel generation. Increasing cycle length allows the potential for reducing the relative outage time: for example, an annual cycle requires three refuelings in a 3-year period, while an 18-month cycle requires only two refuelings in the same time period. Thus, increased capacity factors can result from increased cycle

length; however, increased lengths of fuel outages can partially offset this increase in capacity factors.

The last two columns in Table 5 present the burnup of equilibrium cycle discharges for BWR's and PWR's. Equilibrium cycle is an analytical term that refers to fuel cycles occurring after the initial two cycles of a reactor's operation and prior to its final cycle. It is an assumed condition in which the spent nuclear fuel from a facility has a relatively constant composition from cycle to cycle. In a reactor, this condition typically begins with the third or fourth fuel loading, depending on the portion of the core being replaced. (For the purpose of this report, it is assumed to begin with the third fuel loading.) For example, the first fuel loading may have three sectors: one has an enrichment of 1.7 percent, the second an enrichment of 2.7 percent, and the third an enrichment of 3.7 percent. The first sector would be discharged at the end of the first cycle, with an average burnup of 10 GWDt/MTU; the second sector would be discharged at the end of the second cycle, with a burnup of 20 GWDt/MTU; the third sector would be the first equilibrium cycle discharge and would be discharged at the end of the third cycle.

For BWR's, the average equilibrium spent fuel discharge burnup in 1994 was 33.1 GWDt/MTU. For PWR's, the average equilibrium spent fuel discharge burnup in 1994 was 40.8 GWDt/MTU. The trends in achieved burnup levels for BWR and PWR spent fuel discharged to date (Figure 6) illustrate that PWR spent fuel has achieved increasingly higher burnup levels than BWR spent fuel.

Table 5. Annual Spent Fuel Discharges and Burnup, 1968-1994

Year	Number of Assemblies			Metric Tons of Uranium			Average Burnup (GWDt/MTU)			
							All Discharged Assemblies		Equilibrium Cycle Discharges	
	BWR	PWR	Total	BWR	PWR	Total	BWR	PWR	BWR	PWR
1968	5	0	5	0.6	0.0	0.6	1.6	0.0	1.6	0.0
1969	96	0	96	9.8	0.0	9.8	15.2	0.0	15.2	0.0
1970	29	99	128	5.6	39.0	44.6	0.3	18.4	0.0	0.0
1971	413	113	526	64.7	44.5	109.2	5.8	23.9	16.3	0.0
1972	801	282	1,083	145.8	99.9	245.7	6.6	21.9	14.9	28.0
1973	564	165	729	93.5	67.1	160.6	12.4	23.7	16.1	28.1
1974	1,290	575	1,865	241.6	207.7	449.2	12.7	18.9	14.6	25.7
1975	1,223	797	2,020	225.8	321.8	547.6	16.9	18.1	17.3	27.3
1976	1,666	931	2,597	298.1	401.0	699.1	13.5	22.2	16.7	25.8
1977	2,047	1,107	3,154	383.2	466.9	850.1	16.6	25.1	19.0	27.8
1978	2,239	1,665	3,904	383.6	698.6	1,082.2	19.8	26.4	22.1	28.7
1979	2,131	1,662	3,793	399.8	721.2	1,121.1	22.4	27.0	23.7	30.2
1980	3,330	1,456	4,786	619.8	618.1	1,237.9	22.4	29.7	23.3	30.7
1981	2,467	1,585	4,052	458.7	675.9	1,134.6	23.9	30.2	23.9	30.9
1982	1,951	1,491	3,442	357.2	640.4	997.6	24.7	29.7	24.9	32.3
1983	2,698	1,776	4,474	491.3	771.3	1,262.6	26.7	30.1	26.7	31.6
1984	2,735	1,937	4,672	497.9	841.3	1,339.2	25.4	29.5	25.4	32.1
1985	2,928	2,036	4,964	531.6	861.0	1,392.7	23.3	31.8	25.7	33.2
1986	2,551	2,291	4,842	458.3	996.2	1,454.5	21.0	30.5	27.3	33.9
1987	3,316	2,593	5,909	597.0	1,108.9	1,705.9	22.4	31.3	27.0	34.4
1988	2,956	2,625	5,581	535.6	1,116.9	1,652.5	24.1	33.4	27.0	35.4
1989	3,832	2,785	6,617	698.0	1,215.3	1,913.3	22.3	32.5	27.3	36.8
1990	3,485	3,489	6,974	632.8	1,504.3	2,137.1	25.0	34.2	27.8	36.0
1991	3,260	2,909	6,169	588.0	1,271.0	1,859.0	28.2	35.3	30.3	37.4
1992	3,841	3,702	7,543	694.8	1,596.4	2,291.2	29.2	36.5	29.8	38.7
1993	3,883	3,531	7,414	699.7	1,531.9	2,231.6	30.3	38.9	31.2	38.9
1994 ^a	3,781	2,824	6,605	675.0	1,207.5	1,882.5	33.1	40.0	33.1	40.8
Temps ^b	626	172	798	113.5	77.9	191.4	^c 0.0	5.6	23.0	9.8
Total	60,144	44,598	104,742	10,901.3	19,102.0	30,003.3	23.5	32.0	22.6	31.4

^aSome data for previous years have been revised. Current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change. See Technical Note 12 in Appendix E.

^bTemps are temporarily discharged assemblies, as of December 31, 1994.

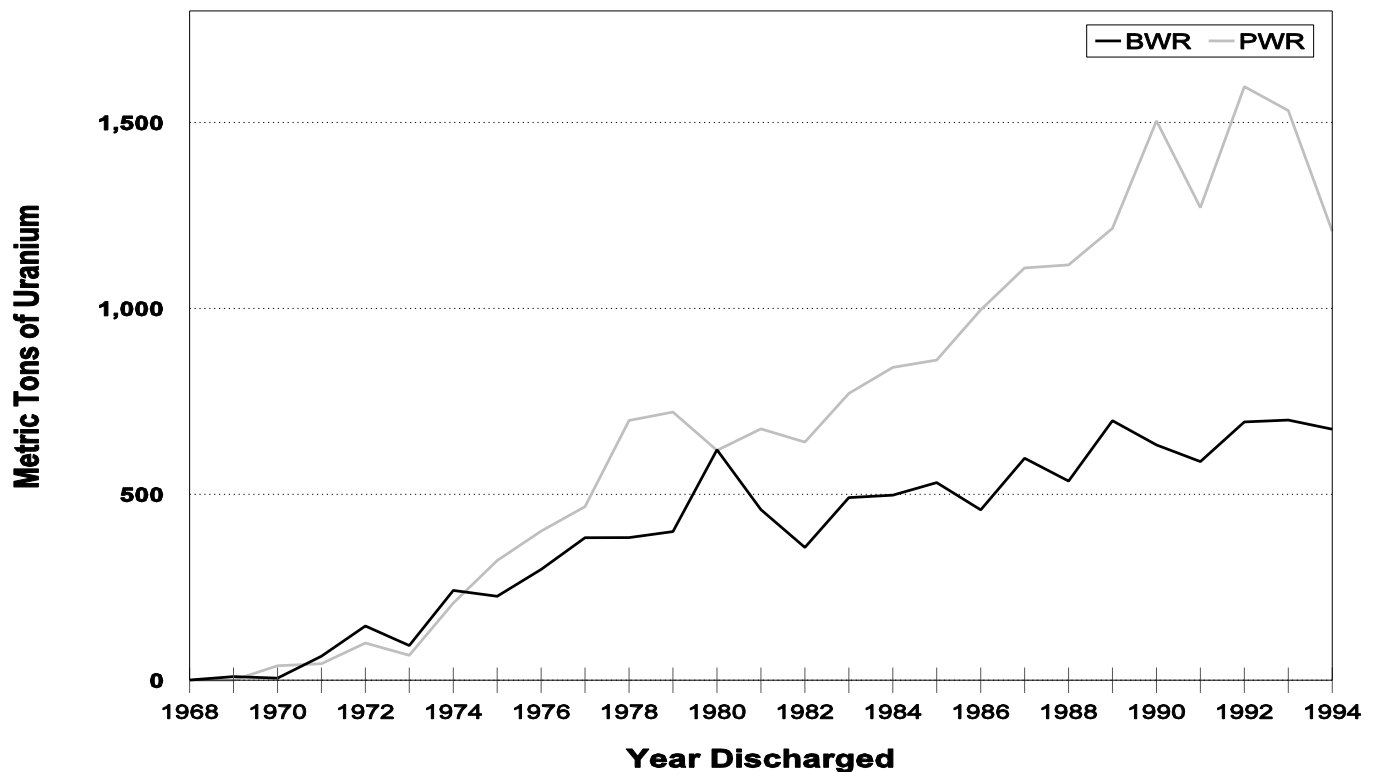
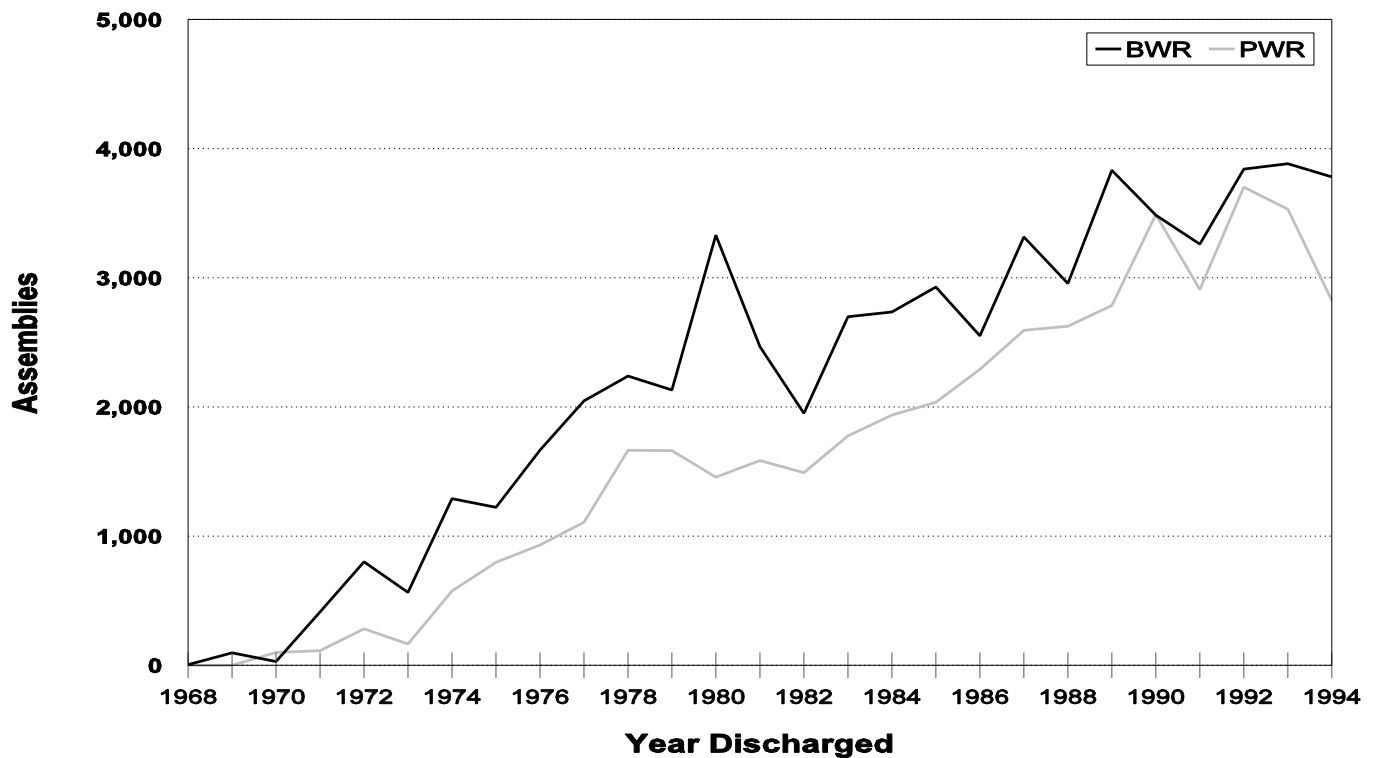
^cAverage Burnup value includes 625 temporarily discharged BWR assemblies with missing burnup data. See Technical Note 10 in Appendix E.

GWDt/MTU = Gigawattdays thermal per metric ton of uranium; BWR = Boiling-water reactor; PWR = Pressurized-water reactor.

Notes: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 24.2 MTU, were discharged. These HTGR fuel elements are not included in the above table. See Technical Note 5 in Appendix E. Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Figure 5. Annual Spent Fuel Discharges, 1968-1994

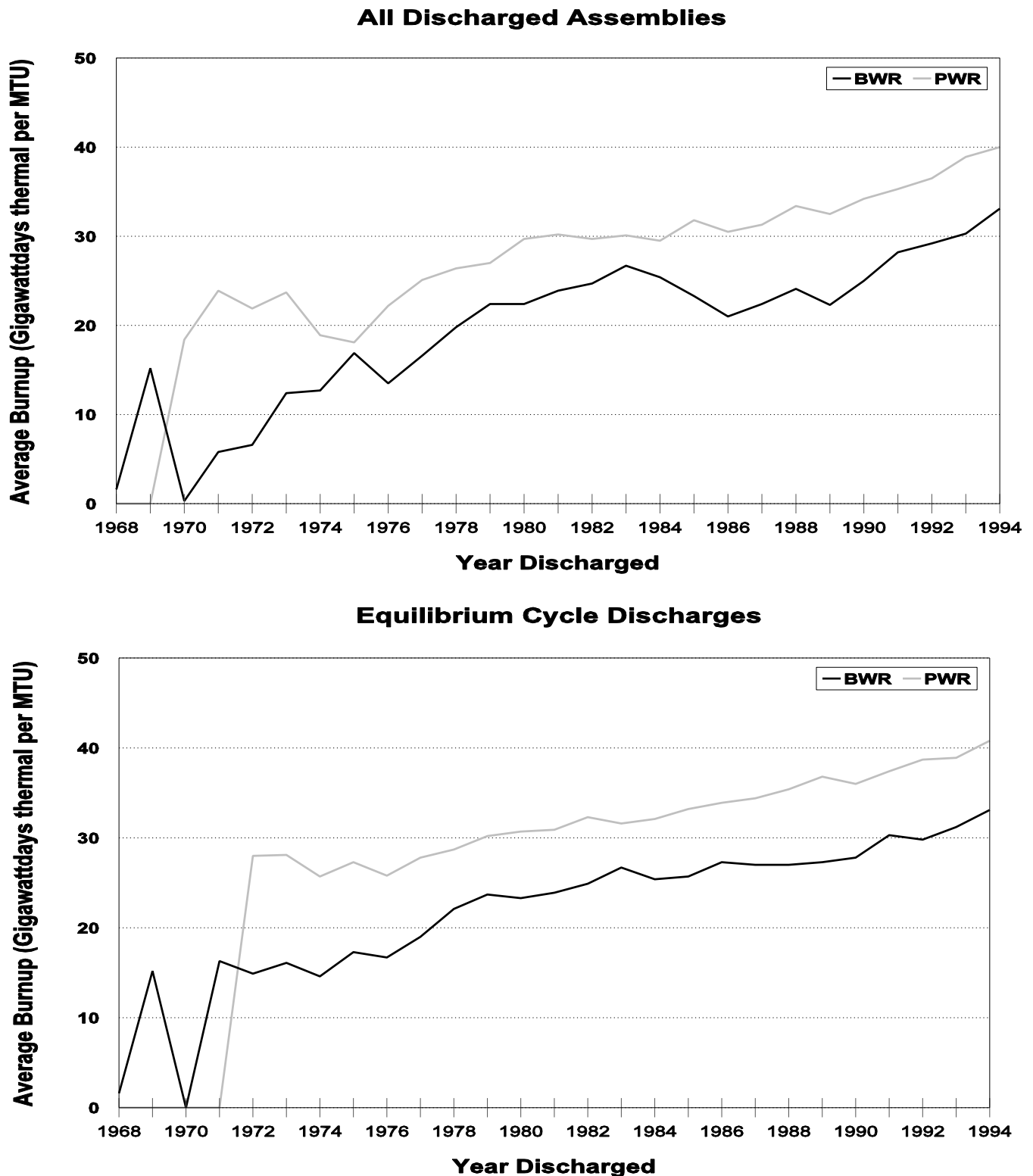


BWR = Boiling-water reactor; PWR = Pressurized-water reactor.

Notes: A number of assemblies discharged prior to 1972 were reprocessed and are not included in this figure. See Table 9 and Technical Note 6 in Appendix E for information on reprocessed assemblies. Graphs do not include 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements and 798 temporarily discharged assemblies.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Figure 6. Annual Average Burnups, 1968-1994



BWR = Boiling-water reactor; PWR = Pressurized-water reactor; MTU = Metric tons of uranium.

Notes: A number of assemblies discharged prior to 1972 were reprocessed and are not included in this figure. See Table 9 and Technical Note 6 in Appendix E for information on reprocessed assemblies. Graphs do not include 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements and 798 temporarily discharged assemblies. Equilibrium Cycle Discharges exclude discharge data for cycles 1 and 2 of each reactor.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Annual spent fuel burnup levels in number of BWR and PWR assemblies (Table 6) have increased over time, as indicated by the progression of larger concentrations of assemblies in higher burnup categories in most recent years. For example, 1,458 BWR assemblies discharged in 1994 (38.6 percent) range from 35 to 40 GWDt/MTU, the highest percentage for that range for any year. A total of 1,771 PWR assemblies (62.7 percent) had burnups greater than 40 GWDt/MTU in 1994. This percentage increased from the 55.0 percent in 1993, thus continuing the pattern for larger concentrations of assemblies in higher burnup categories. On the high end of the discharge burnups, a total of 55 BWR assemblies have exceeded 40 GWDt/MTU, while 113 PWR assemblies have exceeded 50 GWDt/MTU.

As expected, the annual spent fuel burnup distribution by weight for BWR and PWR assemblies (Table 7) parallels the distribution of burnups by assembly (Table 6). These increases show the effect of the improved fuel management practices being used to provide higher burnups.

Examination of the assembly weights, burnups, and enrichment data by burnup range (Table 8) shows that BWR's have discharged over 57 percent of the assemblies, yet PWR's account for approximately 64 percent of the uranium (by weight) that has been discharged; PWR assemblies contain substantially more uranium than BWR assemblies (450 kg versus 200 kg, respectively). Of the discharged BWR assemblies, 63 percent (by initial loading weight of uranium) is

concentrated in the 15 to 30 GWDt/MTU range. For PWR assemblies, 66 percent is concentrated in the 25 to 40 GWDt/MTU range.

Data for reprocessed fuel assemblies have not been collected and, therefore, are not addressed in this report. Data for Fort St. Vrain have been omitted, since it is not a LWR. Three Mile Island Unit 2 ceased operation in 1979; the reactor core is now part of a DOE test and evaluation program. Because of this unique situation, the fuel from Three Mile Island Unit 2 is not included in this report.

Utility Shipments to Away-from-reactor Storage Facilities

There are two types of spent fuel shipments, both of which are regulated by the U.S. Nuclear Regulatory Commission and monitored by state and local governments. The first is the transfer of spent fuel assemblies within an electric utility. These transfers allow the unused spent fuel storage capacity at one site to be used as additional storage for a reactor that may be running low on spent fuel storage capability. They also help utilities use available capacity efficiently and delay the need to build additional storage capabilities. These intrautility transfers are not covered in this report because there is no effect on the utility's storage capability. The second type of shipment is from a utility to an away-from-reactor storage facility (Table 9). There were no shipments of spent fuel from a utility to a storage facility in 1994.

Table 6. Annual Spent Fuel Burnup, 1968-1994
(Assemblies)

Year	Burnup Ranges ^a (GWDt/MTU)												Total
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
Boiling-Water Reactors (BWR)													
1968	5	0	0	0	0	0	0	0	0	0	0	0	5
1969	0	11	10	72	2	1	0	0	0	0	0	0	96
1970	29	0	0	0	0	0	0	0	0	0	0	0	29
1971	216	47	28	106	16	0	0	0	0	0	0	0	413
1972	509	62	172	54	4	0	0	0	0	0	0	0	801
1973	51	91	177	232	12	1	0	0	0	0	0	0	564
1974	0	407	597	249	37	0	0	0	0	0	0	0	1,290
1975	2	15	327	735	144	0	0	0	0	0	0	0	1,223
1976	5	392	599	656	14	0	0	0	0	0	0	0	1,666
1977	0	251	208	1,250	334	4	0	0	0	0	0	0	2,047
1978	66	198	106	502	1,283	84	0	0	0	0	0	0	2,239
1979	0	0	108	582	794	645	2	0	0	0	0	0	2,131
1980	76	2	3	505	2,210	476	58	0	0	0	0	0	3,330
1981	0	1	1	314	1,426	717	4	4	0	0	0	0	2,467
1982	0	1	26	135	764	945	75	3	2	0	0	0	1,951
1983	0	0	5	25	620	1,852	194	2	0	0	0	0	2,698
1984	0	43	237	2	742	1,318	391	0	2	0	0	0	2,735
1985	92	232	101	226	580	1,640	56	0	1	0	0	0	2,928
1986	276	176	232	376	243	1,014	232	2	0	0	0	0	2,551
1987	168	204	385	232	137	1,950	238	0	2	0	0	0	3,316
1988	92	132	10	234	929	1,072	487	0	0	0	0	0	2,956
1989	168	92	372	388	1,051	1,263	478	20	0	0	0	0	3,832
1990	92	0	184	368	582	1,357	893	9	0	0	0	0	3,485
1991	96	132	0	40	137	1,183	1,604	68	0	0	0	0	3,260
1992	0	0	41	411	340	466	1,991	592	0	0	0	0	3,841
1993	0	0	0	167	261	793	1,963	699	0	0	0	0	3,883
1994 ^b	0	0	5	6	109	625	1,530	1,458	44	4	0	0	3,781
Temps ^c ...	0	0	0	0	1	0	0	0	0	0	0	0	^d 626
Total	1,943	2,489	3,934	7,867	12,772	17,406	10,196	2,857	51	4	0	0	60,144

See footnotes at end of table.

Table 6. Annual Spent Fuel Burnup, 1968-1994 (Continued)
(Assemblies)

Year	Burnup Ranges ^a (GWDt/MTU)												Total
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	
Pressurized-Water Reactors (PWR)													
1968	0	0	0	0	0	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0	0	0	0	0	0
1970	0	0	4	95	0	0	0	0	0	0	0	0	99
1971	0	12	0	0	16	85	0	0	0	0	0	0	113
1972	0	0	31	74	80	44	53	0	0	0	0	0	282
1973	0	0	0	59	0	85	21	0	0	0	0	0	165
1974	41	4	225	34	119	148	4	0	0	0	0	0	575
1975	7	107	231	131	181	82	58	0	0	0	0	0	797
1976	0	0	12	437	193	147	142	0	0	0	0	0	931
1977	0	0	6	257	248	351	205	40	0	0	0	0	1,107
1978	0	2	120	219	99	780	301	143	1	0	0	0	1,665
1979	0	0	66	238	152	550	542	113	1	0	0	0	1,662
1980	0	0	1	0	145	579	661	65	5	0	0	0	1,456
1981	0	0	40	4	57	528	838	115	3	0	0	0	1,585
1982	0	0	4	177	181	162	674	281	6	1	3	2	1,491
1983	0	12	8	175	98	378	757	335	12	0	1	0	1,776
1984	0	0	142	100	122	443	839	282	9	0	0	0	1,937
1985	0	0	0	112	32	516	736	576	63	1	0	0	2,036
1986	0	2	65	293	35	430	745	629	86	3	3	0	2,291
1987	0	0	64	180	118	403	957	739	132	0	0	0	2,593
1988	0	0	0	177	34	316	807	1,008	266	11	1	5	2,625
1989	0	0	96	210	155	262	647	926	451	37	0	1	2,785
1990	0	0	44	178	37	267	920	1,434	591	17	1	0	3,489
1991	0	40	115	3	147	140	345	1,371	591	149	8	0	2,909
1992	0	44	40	105	28	244	658	1,084	1,178	288	33	0	3,702
1993	0	0	1	5	54	143	370	1,016	1,470	467	5	0	3,531
1994 ^b	8	0	65	23	14	17	256	670	1,182	539	47	3	2,824
Temps ^c ...	0	0	0	13	7	8	14	0	0	0	0	0	^e 172
Total	56	223	1,380	3,299	2,352	7,108	11,550	10,827	6,047	1,513	102	11	44,598

^aRanges do not overlap. The source data are in batch averages in gigawattdays thermal per metric ton of uranium (GWDt/MTU). Therefore, 0-5 GWDt/MTU means 0 through 4.999 GWDt/MTU; 5-10 GWDt/MTU means 5.000-9.999 GWDt/MTU; etc. See Technical Note 8 in Appendix E.

^bSome data for previous years have been revised. Current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change. See Technical Note 12 in Appendix E.

^cTemps are temporarily discharged assemblies, as of December 31, 1994, as reported on Form RW-859.

^dIncludes 625 temporarily discharged BWR assemblies with missing burnup data. See Technical Note 10 in Appendix E.

^eIncludes 130 temporarily discharged PWR assemblies with missing burnup data. See Technical Note 10 in Appendix E.

Note: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 24.2 MTU, were discharged. These HTGR fuel elements are not included in the above table. See Technical Note 5 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 7. Annual Spent Fuel Burnup, 1968-1994
(Metric tons of uranium)

Year	Burnup Ranges ^a (GWDt/MTU)												
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	Total
Boiling-Water Reactors (BWR)													
1968	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
1969	0.0	1.2	1.0	7.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	9.8
1970	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
1971	41.7	8.6	2.8	10.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.7
1972	98.1	11.9	31.1	4.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	145.8
1973	9.7	17.2	28.8	36.7	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	93.5
1974	0.0	78.6	114.4	44.8	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	241.6
1975	0.3	1.7	62.2	136.4	25.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	225.8
1976	0.9	67.1	108.7	119.1	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	298.1
1977	0.0	48.0	40.3	235.2	58.9	0.7	0.0	0.0	0.0	0.0	0.0	0.0	383.2
1978	6.3	32.4	13.1	84.2	232.4	15.2	0.0	0.0	0.0	0.0	0.0	0.0	383.6
1979	0.0	0.0	18.6	108.7	149.2	123.0	0.3	0.0	0.0	0.0	0.0	0.0	399.8
1980	14.0	0.4	0.6	93.3	413.3	87.6	10.7	0.0	0.0	0.0	0.0	0.0	619.8
1981	0.0	0.2	0.2	58.1	265.4	133.3	0.7	0.7	0.0	0.0	0.0	0.0	458.7
1982	0.0	0.2	4.6	22.6	141.5	173.6	13.8	0.6	0.4	0.0	0.0	0.0	357.2
1983	0.0	0.0	0.9	2.9	113.5	337.8	35.7	0.4	0.0	0.0	0.0	0.0	491.3
1984	0.0	7.9	43.0	0.3	136.0	239.5	70.8	0.0	0.4	0.0	0.0	0.0	497.9
1985	16.9	42.5	18.5	39.5	106.3	297.4	10.2	0.0	0.2	0.0	0.0	0.0	531.6
1986	50.8	32.4	42.5	66.6	43.1	180.8	41.7	0.4	0.0	0.0	0.0	0.0	458.3
1987	31.0	36.1	68.8	40.8	24.7	352.5	42.9	0.0	0.4	0.0	0.0	0.0	597.0
1988	17.0	24.5	1.8	42.9	168.3	192.4	88.7	0.0	0.0	0.0	0.0	0.0	535.6
1989	30.9	16.9	68.4	71.8	193.2	227.7	85.5	3.6	0.0	0.0	0.0	0.0	698.0
1990	17.0	0.0	34.0	67.6	106.2	247.5	158.9	1.6	0.0	0.0	0.0	0.0	632.8
1991	17.8	24.6	0.0	7.2	23.9	215.1	287.2	12.1	0.0	0.0	0.0	0.0	588.0
1992	0.0	0.0	7.6	75.7	62.5	83.9	361.8	103.4	0.0	0.0	0.0	0.0	694.8
1993	0.0	0.0	0.0	31.0	47.4	144.8	353.8	122.7	0.0	0.0	0.0	0.0	699.7
1994 ^b	0.0	0.0	0.8	1.1	19.0	113.5	275.4	256.8	7.6	0.7	0.0	0.0	675.0
Temps ^c	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	^d 113.5
Total	358.6	452.1	712.9	1,408.0	2,340.0	3,166.7	1,838.0	502.1	8.9	0.7	0.0	0.0	10,901.3

See footnotes at end of table.

Table 7. Annual Spent Fuel Burnup, 1968-1994 (Continued)
(Metric tons of uranium)

Year	Burnup Ranges ^a (GWDt/MTU)												
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	Total
Pressurized-Water Reactors (PWR)													
1968	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1969	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1970	0.0	0.0	1.7	37.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.0
1971	0.0	4.6	0.0	0.0	6.2	33.7	0.0	0.0	0.0	0.0	0.0	0.0	44.5
1972	0.0	0.0	11.9	29.3	27.8	8.9	22.1	0.0	0.0	0.0	0.0	0.0	99.9
1973	0.0	0.0	0.0	26.1	0.0	33.3	7.6	0.0	0.0	0.0	0.0	0.0	67.1
1974	7.4	1.5	86.4	13.6	40.5	57.2	1.1	0.0	0.0	0.0	0.0	0.0	207.7
1975	2.7	42.6	95.0	53.6	79.3	25.3	23.1	0.0	0.0	0.0	0.0	0.0	321.8
1976	0.0	0.0	5.6	194.2	82.4	63.3	55.4	0.0	0.0	0.0	0.0	0.0	401.0
1977	0.0	0.0	2.8	108.3	113.0	140.3	87.1	15.4	0.0	0.0	0.0	0.0	466.9
1978	0.0	0.9	47.9	89.8	45.1	329.0	125.0	60.4	0.4	0.0	0.0	0.0	698.6
1979	0.0	0.0	30.6	109.4	64.0	227.6	239.1	50.1	0.5	0.0	0.0	0.0	721.2
1980	0.0	0.0	0.4	0.0	66.8	246.1	276.4	26.3	2.0	0.0	0.0	0.0	618.1
1981	0.0	0.0	17.2	1.9	25.8	228.5	351.6	49.6	1.3	0.0	0.0	0.0	675.9
1982	0.0	0.0	1.8	81.2	80.4	61.4	290.6	119.7	2.7	0.4	1.3	0.9	640.4
1983	0.0	5.5	3.1	80.6	44.7	166.7	327.6	137.3	5.4	0.0	0.5	0.0	771.3
1984	0.0	0.0	58.0	45.2	56.3	195.3	365.0	117.4	4.1	0.0	0.0	0.0	841.3
1985	0.0	0.0	0.0	49.0	13.6	218.7	317.8	237.5	24.1	0.4	0.0	0.0	861.0
1986	0.0	0.8	27.6	131.1	15.6	181.2	336.3	265.6	35.5	1.3	1.3	0.0	996.2
1987	0.0	0.0	27.2	77.7	53.4	175.3	411.9	311.7	51.8	0.0	0.0	0.0	1,108.9
1988	0.0	0.0	0.0	79.7	14.7	138.4	345.1	428.9	103.1	4.6	0.4	2.0	1,116.9
1989	0.0	0.0	47.1	91.4	68.6	112.1	283.0	408.4	189.1	15.2	0.0	0.4	1,215.3
1990	0.0	0.0	22.3	83.4	16.2	121.2	393.8	611.0	249.2	7.0	0.3	0.0	1,504.3
1991	0.0	9.2	53.2	1.4	79.0	52.5	148.8	606.2	253.1	64.2	3.4	0.0	1,271.0
1992	0.0	19.8	14.8	43.7	12.3	115.5	287.7	463.9	504.9	118.9	14.8	0.0	1,596.4
1993	0.0	0.0	0.5	2.3	22.4	67.4	167.3	444.6	627.4	197.8	2.1	0.0	1,531.9
1994 ^b	3.2	0.0	27.8	9.8	6.5	7.5	107.5	292.9	506.1	225.5	19.4	1.3	1,207.5
Temps ^c	0.0	0.0	0.0	5.7	3.2	3.7	5.7	0.0	0.0	0.0	0.0	0.0	^e 77.9
Total	13.4	85.0	582.9	1,445.7	1,037.9	3,010.1	4,976.6	4,647.0	2,560.6	635.3	43.5	4.5	19,102.0

^aRanges do not overlap. The source data are in batch averages in gigawattdays thermal per metric ton of uranium (GWDt/MTU). Therefore, 0-5 GWDt/MTU means 0 through 4.999 GWDt/MTU; 5-10 GWDt/MTU means 5.000-9.999 GWDt/MTU; etc. See Technical Note 8 in Appendix E.

^bSome data for previous years have been revised. Current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change. See Technical Note 12 in Appendix E.

^cTemps are temporarily discharged assemblies, as of December 31, 1994, as reported on Form RW-859.

^dIncludes 113.3 MTU for temporarily discharged BWR assemblies with missing burnup data. See Technical Note 10 in Appendix E.

^eIncludes 59.7 MTU for temporarily discharged PWR assemblies with missing burnup data. See Technical Note 10 in Appendix E.

Notes: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 24.2 MTU, were discharged. These HTGR fuel elements are not included in the above table. See Technical Note 5 in Appendix E. Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 8. U.S. Burnup Distribution for All Discharged Assemblies

Burnup Ranges ^a (GWDt/MTU)	Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Average Enrichment (weight percent)
Boiling-Water Reactors (BWR)				
0-5	1,943	358.6	3.3	1.34
5-10	2,489	452.1	8.4	1.52
10-15	3,934	712.9	12.5	2.06
15-20	7,867	1,408.0	17.8	2.12
20-25	12,772	2,340.0	22.8	2.39
25-30	17,406	3,166.7	27.3	2.67
30-35	10,196	1,838.0	31.8	2.91
35-40	2,857	502.1	36.1	3.19
40-45	51	8.9	40.3	3.09
45-50	4	0.7	47.0	3.31
Total	^b 60,144	^c 10,901.3	23.5	2.47
Pressurized-Water Reactors (PWR)				
0-5	56	13.4	4.0	2.81
5-10	223	85.0	8.7	3.08
10-15	1,380	582.9	12.9	2.09
15-20	3,299	1,445.7	17.5	2.19
20-25	2,352	1,037.9	22.5	2.60
25-30	7,108	3,010.1	27.6	2.87
30-35	11,550	4,976.6	32.4	3.18
35-40	10,827	4,647.0	37.0	3.42
40-45	6,047	2,560.6	41.6	3.66
45-50	1,513	635.3	46.2	3.88
50-55	102	43.5	51.2	3.86
55-60	11	4.5	55.9	3.59
Total	^d 44,598	^e 19,102.0	32.0	3.13
Total Reactors				
0-5	1,999	371.9	3.3	1.39
5-10	2,712	537.1	8.5	1.77
10-15	5,314	1,295.8	12.7	2.08
15-20	11,166	2,853.7	17.6	2.15
20-25	15,124	3,377.9	22.7	2.46
25-30	24,514	6,176.7	27.4	2.77
30-35	21,746	6,814.7	32.2	3.11
35-40	13,684	5,149.1	36.9	3.40
40-45	6,098	2,569.5	41.6	3.65
45-50	1,517	636.0	46.2	3.88
50-55	102	43.5	51.2	3.86
55-60	11	4.5	55.9	3.59
Total	104,742	30,003.3	28.9	2.89

^aRanges do not overlap. The source data are in batch averages in gigawattdays thermal per metric ton of uranium (GWDt/MTU). Therefore, 0-5 GWDt/MTU means 0 through 4.999 GWDt/MTU; 5-10 GWDt/MTU means 5.000-9.999 GWDt/MTU; etc. See Technical Note 8 in Appendix E.

^bNo assigned burnup range for 625 temporarily discharged BWR assemblies. These BWR assemblies are included in the column total. See Technical Note 10 in Appendix E.

^cIncludes 113.3 MTU for temporarily discharged BWR assemblies with no assigned burnup range. These weights are included in the column total. See Technical Note 10 in Appendix E.

^dNo assigned burnup range for 130 temporarily discharged PWR assemblies. These PWR assemblies are included in the column total. See Technical Note 10 in Appendix E.

^eIncludes 59.7 MTU for temporarily discharged PWR assemblies with no assigned burnup range. These weights are included in the column total. See Technical Note 10 in Appendix E.

Notes: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 24.2 MTU, were discharged. These HTGR fuel elements are *not* included in the Total Reactors section of the table. See Technical Note 5 in Appendix E. Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 9. Fuel Stored in Away-from-reactor Facilities

Shipped From	Stored At		
Reactor Name	Away-from-reactor Facility Name	Number of Assemblies	Initial Uranium Content (MTU)
Calvert Cliffs 1	Washington (Hanford)	2	0.8
Dresden 1	Idaho National Engineering Laboratory ^a	3	0.3
Dresden 1	South Carolina (Savannah River Site)	^b 8	0.6
Dresden 1	West Valley Demonstration Project	^c 683	72.6
Dresden 2	General Electric Company (Morris Operation)	753	^d 145.2
Big Rock Point	West Valley Demonstration Project	85	11.5
LaCrosse	South Carolina (Savannah River Site)	^b 1	0.1
Turkey Point 3	Idaho National Engineering Laboratory	18	8.2
Cooper Station	General Electric Company (Morris Operation)	1,054	198.0
Cooper Station	Washington (Hanford)	2	0.4
Monticello	General Electric Company (Morris Operation)	1,058	198.2
Humboldt Bay	West Valley Demonstration Project	^e 270	21.3
Peach Bottom 2	Idaho National Engineering Laboratory	2	0.4
Ginna	West Valley Demonstration Project	40	15.3
San Onofre 1	General Electric Company (Morris Operation)	270	98.4
Surry 1	Idaho National Engineering Laboratory	1	0.5
Surry 2	Idaho National Engineering Laboratory	68	31.0
Point Beach 1	Idaho National Engineering Laboratory	6	2.4
Point Beach 1	Washington (Hanford)	3	1.2
Haddam Neck	General Electric Company (Morris Operation)	82	34.5
Haddam Neck	Idaho National Engineering Laboratory ^f	1	0.4
Total Assemblies Shipped from Utilities to Storage Facilities		4,410	841.3
Assemblies Reported on Form RW-859 as Reprocessed^g		962	94.7
Total Fuel Stored in Away-from-reactor Facilities		3,448	746.6

^aOriginal shipment of one assembly with initial uranium content of 0.1 metric tons of uranium (MTU) from Dresden 1 to General Electric Company (Vallecitos Nuclear). See Technical Note 15 in Appendix E.

^bAll assemblies shipped to South Carolina (Savannah River Site) have been reprocessed.

^cAssemblies shipped from Dresden 1 to West Valley Demonstration Project have been reprocessed.

^dValue presented represents an historical change by the utility.

^eAssemblies shipped from Humboldt Bay to West Valley Demonstration Project have been reprocessed.

^fOriginal shipment from Haddam Neck to Ohio (Battelle). See Technical Note 15 in Appendix E.

^gComplete historical data are not available for reprocessed assemblies. See Technical Note 6 in Appendix E.

Notes: A total of 744 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 8.8 MTU, were shipped from Fort St. Vrain to Idaho National Engineering Laboratory. These HTGR fuel elements are not included in the above table. See Technical Note 5 in Appendix E. Round-trip shipments are not included in this table. Total may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

2. Site Capacities, Inventories, and Dry Storage at Utilities and Storage Facilities

Site Capacities and Inventories at Utilities

Respondents to the Form RW-859 were asked to report their maximum established spent fuel storage capacity for each site (in number of assemblies). The definition used by EIA was "the maximum number of intact assemblies that will be able to be stored at some point in the future (between the reporting date and the reactor's end of life) considering any established or current studies or engineering evaluations, at the time of submittal for licensing approval from the U.S. Nuclear Regulatory Commission (NRC)" (see Technical Note 13). The maximum storage capacity can change from year to year as reflected in Table 10 and the pictograms in Appendix C.

The total licensed capacity for storage of spent nuclear fuel in the United States as of December 31, 1994, was 218,803 slots (or cells) with each slot capable of holding one assembly (Table 10). The reported maximum capacity was 218,967 including 5,660 dry storage slots, 3,061 off-site slots, and 210,246 on-site slots in storage pools. These totals change slightly as the calculation assumptions change. (Footnotes i and j of Table 10 explain the assumptions used in calculating this total.)

Many electric utilities are in the process of reracking their storage pools to achieve a higher maximum capacity; some have inaccessible slots that lower their maximum capacity (Table 10). For example, Arkansas Power and Light Company's Arkansas Nuclear 2 plant has a licensed storage capacity of 988 assemblies. A total of 29 slots, classified as permanently unusable, are unusable due to heavy loading restrictions and are blocked by piping. With an additional 26 slots that will never be used for spent fuel storage, Arkansas Nuclear 2 plant storage pool has a maximum established storage capacity of 933 assemblies. Virginia Power's North Anna 1 & 2 spent fuel storage pool has a licensed capacity of 1,737 assemblies and a maximum established storage capacity of 1,677 assemblies. Not included in the maximum capacity are 60 slots that will never store spent fuel. Of these 60 slots,

22 are unusable due to physical interference and 38 are North Anna 1 canal door heavy load path slots. In addition, 8 slots are temporarily unusable as they contain 2 fuel canisters, a debris pan, 2 dummy assemblies, a clip basket, and a surveillance canister. However, because these temporarily unusable slots can be rendered useful for storing spent fuel, they are included in the maximum established storage capacity.

The total initial uranium content of assemblies in storage is 30,003.3 metric tons of uranium (MTU). The total inventory of light-water reactor (LWR) spent nuclear fuel in storage in the United States as of December 31, 1994, is 104,742 assemblies. Of these, 101,294 assemblies are in storage at 118 reactors that have discharged and/or are storing nuclear fuel assemblies, including 1,525 assemblies in the Independent Spent Fuel Storage Installations (ISFSI's) at Baltimore Gas and Electric Company's Calvert Cliffs plant, Carolina Power and Light Company's Robinson 2 plant, Consumers Power Company's Palisades plant, Duke Power Company's Oconee plant, and Virginia Power's Surry plant. An additional 3,448 assemblies are stored at away-from-reactor storage facilities.

Site Capacities and Inventories at Storage Facilities

More than 99 percent of the assemblies at U.S. away-from-reactor storage facilities are located at General Electric Morris, DOE's Idaho National Engineering Laboratory, and the West Valley Demonstration Project (Table 11). LWR spent nuclear fuel is stored in 34 states (Table 12, Figure 7, Figure 8), with 20 states storing BWR fuel and 31 states storing PWR fuel. In addition, 2,208 high-temperature, gas-cooled reactor spent fuel elements are stored in Colorado and Idaho. The data in Table 12 include all permanently discharged assemblies and all temporarily discharged assemblies with uranium content that are scheduled to be reinserted at a later date. The away-from-reactor storage facilities are also included in the state totals.

Table 10. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1994

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity ^a	Maximum Established Storage Capacity ^b	Current Inventory ^c	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies ^d
Alabama Power Company	Farley 1	PWR	0101	1,407	1,407	716	330.1	0
	Farley 2	PWR	0102	1,407	1,407	558	257.4	0
Arizona Public Service Company	Palo Verde 1	PWR	0301	665	1,323	368	151.7	0
	Palo Verde 2	PWR	0302	665	1,323	384	156.5	0
	Palo Verde 3	PWR	0303	665	1,322	380	156.4	1
Arkansas Power and Light Company	Arkansas Nuclear 1	PWR	0401	968	948	684	316.9	0
	Arkansas Nuclear 2	PWR	0402	988	933	636	263.9	0
Baltimore Gas and Electric Company	Calvert Cliffs 1	PWR	0501	1,830	1,830	1,394	533.9	0
	Calvert Cliffs 2	PWR		0	0	0	0.0	0
	Dry Storage	PWR	0501D	2,880	1,152	192	73.9	0
Boston Edison Company	Pilgrim 1	BWR	0601	2,320	2,875	1,628	301.6	0
Carolina Power and Light Company	^e Brunswick 1	BWR	0701	1,803	1,767	942	174.4	1
	Brunswick 1	^f PWR	0701	160	160	160	71.3	0
	^e Brunswick 2	BWR	0702	1,839	1,767	891	164.8	0
	Brunswick 2	^f PWR	0702	144	144	144	65.5	0
	^g Harris 1	PWR	0703	4,184	1,832	500	221.2	0
	^g Harris 1	BWR	0703	5,808	2,541	1,059	195.4	0
	Robinson 2	PWR	0705	544	537	240	102.0	0
	Dry Storage	PWR	0705D	56	56	56	24.1	0
Cleveland Electric Illuminating Company	Perry 1	BWR	0901	4,020	4,020	972	177.9	0
		BWR	0902	0	0	0	0.0	0

See footnotes at end of table.

Table 10. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1994 (Continued)

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity ^a	Maximum Established Storage Capacity ^b	Current Inventory ^c	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies ^d
Commonwealth Edison Company	Braidwood 1	PWR	1001	2,870	2,842	668	283.6	0
	Braidwood 2	PWR						
	Byron 1	PWR	1003	2,870	2,823	864	366.8	0
	Byron 2	PWR						
	Dresden 1	BWR	1005	720	718	683	69.5	0
	Dresden 2	BWR	1006	3,537	3,537	2,162	388.0	0
	Dresden 3	BWR	1007	3,537	3,534	2,148	385.9	0
	LaSalle County 1	BWR	1008	7,993	7,780	2,360	433.4	0
	LaSalle County 2	BWR		0	0	0	0.0	0
	Quad Cities 1	BWR	1010	7,554	7,533	4,284	788.1	0
	Quad Cities 2	BWR		0	0	0	0.0	0
	Zion 1	PWR	1012	3,012	2,929	1,684	769.1	0
	Zion 2	PWR						
Consolidated Edison Company of New York	Indian Point 1	PWR	1101	756	756	160	30.6	0
	Indian Point 2	PWR	1102	1,374	1,374	756	343.9	8
Consumers Power Company	Big Rock Point	BWR	1201	441	441	336	44.1	1
	Palisades	PWR	1204	896	888	745	297.9	1
	Dry Storage	PWR	1204D	600	576	48	18.6	0
Dairyland Power Cooperative	LaCrosse	BWR	1301	440	440	333	38.0	0
Detroit Edison Company	Enrico Fermi 2	BWR	1402	2,383	2,383	900	161.9	40
Duke Power Company	Catawba 1	PWR	1501	1,419	1,419	484	206.6	0
	Catawba 2	PWR	1502	1,418	1,421	444	188.5	0
	McGuire 1	PWR	1504	1,463	1,472	651	285.2	0
	McGuire 2	PWR	1505	1,463	1,472	893	397.6	0
	Oconee 1	PWR	1506	1,312	1,311	1,026	474.8	0
	Oconee 2	PWR						
	Oconee 3	PWR	1508	825	818	528	244.9	0
	Dry Storage	PWR	1506D	2,112	2,112	696	322.9	0
Duquesne Light Company	Beaver Valley 1	PWR	1601	833	1,621	576	265.6	13
	Beaver Valley 2	PWR	1602	1,088	1,088	260	120.0	0
Florida Power Corporation	Crystal River 3	PWR	1701	1,357	1,357	608	282.2	5

Table 10. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1994 (Continued)

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity ^a	Maximum Established Storage Capacity ^b	Current Inventory ^c	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies ^d
See footnotes at end of table.								
Florida Power and Light Company	St. Lucie 1	PWR	1801	1,706	1,705	964	363.7	0
	St. Lucie 2	PWR	1802	1,584	1,076	544	205.9	0
	Turkey Point 3	PWR	1803	1,404	1,376	640	291.6	0
	Turkey Point 4	PWR	1804	1,404	1,376	650	296.3	0
Georgia Power Company	Hatch 1	BWR	2001	6,026	5,926	3,919	721.3	0
	Hatch 2	BWR		0	0	0	0.0	0
	Vogtle 1	PWR	2003	2,386	2,283	646	297.5	0
	Vogtle 2	PWR		0	0	0	0.0	0
GPU Nuclear Corporation	Three Mile Island 1	PWR	1901	1,990	1,990	601	278.9	23
	Oyster Creek	BWR	1903	2,645	2,645	2,048	374.4	0
Gulf States Utilities Company	River Bend 1	BWR	2101	2,680	3,172	956	175.9	0
Houston Lighting and Power Company	South Texas 1	PWR	2201	1,969	1,958	236	127.9	7
	South Texas 2	PWR	2202	1,969	1,958	188	101.5	0
IES Utilities, Inc.	Duane Arnold	BWR	2401	2,050	1,898	1,280	235.3	0
Illinois Power Company	Clinton 1	BWR	2301	2,512	2,512	724	133.2	0
Indiana Michigan Power Company	Cook 1	PWR	5801	3,613	3,613	1,679	738.0	0
	Cook 2	PWR						
Kansas Gas and Electric Company	Wolf Creek 1	PWR	2501	1,340	1,327	488	226.0	0
Long Island Power Authority	Shoreham	BWR	2601	2,436	2,685	0	0.0	0
Louisiana Power and Light Company	Waterford 3	PWR	2701	1,088	1,070	520	214.0	0
Maine Yankee Atomic Power Company	Maine Yankee	PWR	2801	1,476	1,464	1,149	433.0	18

Table 10. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1994 (Continued)

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity ^a	Maximum Established Storage Capacity ^b	Current Inventory ^c	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies ^d
Nebraska Public Power District	Cooper Station	BWR	3001	2,366	2,366	804	147.9	0
See footnotes at end of table.								
New York Power Authority	FitzPatrick	BWR	3901	2,797	2,797	1,888	348.0	0
	Indian Point 3	PWR	3902	1,345	1,342	584	267.6	2
Niagara Mohawk Power Corporation	Nine Mile Point 1	BWR	3101	2,776	2,560	1,812	335.7	0
	Nine Mile Point 2	BWR	3102	4,049	2,528	640	118.2	0
North Atlantic Energy Service Corporation	Seabrook	PWR	5901	1,236	1,236	208	96.3	0
Northeast Utilities Service Company	Millstone 1	BWR	3201	3,229	3,229	2,304	424.8	0
	Millstone 2	PWR	3202	1,072	1,299	868	342.9	0
	Millstone 3	PWR	3203	756	756	332	152.8	0
	Haddam Neck	PWR	5701	1,172	1,167	809	333.3	0
Northern States Power Company	Monticello	BWR	3301	2,237	2,229	822	146.8	0
	Prairie Island 1	PWR	3302	1,386	1,378	1,329	500.9	0
	Prairie Island 2	PWR						
Omaha Public Power District	Fort Calhoun	PWR	3401	729	1,083	570	205.0	0
Pacific Gas and Electric Company	Diablo Canyon 1	PWR	3501	1,324	1,324	464	209.4	0
	Diablo Canyon 2	PWR	3502	1,324	1,317	484	217.7	0
	Humboldt Bay	BWR	3503	487	486	390	28.9	0
PECO Energy Company	Limerick 1	BWR	3701	6,157	8,129	2,492	458.9	^h 504
	Limerick 2	BWR		0	0	0	0.0	0
	Peach Bottom 2	BWR	3704	3,819	3,819	2,434	449.0	0
	Peach Bottom 3	BWR	3705	3,819	3,814	2,200	408.2	0
Pennsylvania Power and Light Company	Susquehanna 1	BWR	3601	5,680	5,680	3,112	555.6	0
	Susquehanna 2	BWR		0	0	0	0.0	0

Table 10. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1994 (Continued)

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity ^a	Maximum Established Storage Capacity ^b	Current Inventory ^c	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies ^d
Portland General Electric Company	Trojan	PWR	3801	1,408	1,395	780	358.9	0

See footnotes at end of table.

Table 10. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1994 (Continued)

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity ^a	Maximum Established Storage Capacity ^b	Current Inventory ^c	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies ^d
Public Service Electric and Gas Company	Hope Creek	BWR	4201	4,006	3,998	1,240	229.5	0
	Salem 1	PWR	4202	1,632	1,632	708	326.5	23
	Salem 2	PWR	4203	1,632	1,151	556	256.4	34
Rochester Gas and Electric Corporation	Genoa	PWR	4401	1,016	1,015	721	271.2	0
Sacramento Municipal Utility District	Rancho Seco	PWR	4501	1,080	1,080	493	228.4	0
South Carolina Electric and Gas Company	Summer	PWR	4601	1,276	1,276	504	225.5	0
Southern California Edison Company	San Onofre 1	PWR	4701	216	216	207	76.4	0
	San Onofre 2	PWR	4702	1,542	1,542	662	270.1	0
	San Onofre 3	PWR	4703	1,542	1,542	710	287.8	0
System Energy Resources, Inc.	Grand Gulf 1	BWR	2901	2,324	3,972	1,660	298.5	0
Tennessee Valley Authority	Browns Ferry 1	BWR	4803	6,942	6,942	3,560	660.4	80
	Browns Ferry 2	BWR		0	0	0	0.0	0
	Browns Ferry 3	BWR	4805	3,471	3,471	1,030	191.4	0
	Sequoyah 1	PWR	4808	1,386	2,091	901	415.3	0
	Sequoyah 2	PWR						
	Watts Bar 1	PWR	4810	1,312	1,294	0	0.0	0
Toledo Edison Company	Davis-Besse	PWR	5001	735	720	520	244.2	2
TU Electric	Comanche Peak 1	PWR	4901	1,116	1,289	293	131.8	0
	Comanche Peak 2	PWR		0	0	0	0.0	0
Union Electric Company	Callaway	PWR	5101	1,340	1,340	548	240.1	2
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	BWR	6001	2,870	2,860	1,978	365.9	0

See footnotes at end of table.

Table 10. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1994 (Continued)

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity ^a	Maximum Established Storage Capacity ^b	Current Inventory ^c	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies ^d
Virginia Power	North Anna 1	PWR	5201	1,737	1,677	1,189	547.3	19
	North Anna 2	PWR						
	Surry 1	PWR	5203	1,044	1,044	799	366.1	10
	Surry 2	PWR						
	Dry Storage	PWR	5203D	1,764	1,764	533	241.4	0
Washington Public Power Supply System	Washington Nuclear 2	BWR	5302	2,658	2,654	1,196	216.1	0
Wisconsin Electric Power Company	Point Beach 1	PWR	5401	1,502	1,500	1,306	506.2	0
	Point Beach 2	PWR						
Wisconsin Public Service Corporation	Kewaunee	PWR	5501	990	990	688	265.0	4
Yankee Atomic Electric Company	Yankee Rowe	PWR	5601	721	721	533	127.2	0
Total (Nuclear Power Plant Sites Only)				ⁱ215,742	ⁱ215,906	101,294	29,256.7	798
Away-from-reactor Storage Facilities (From Table 11)				3,061	3,061	3,448	746.6	0
Total (Including Away-From-Reactor Storage Facilities)				ⁱ218,803	ⁱ218,967	104,742	30,003.3	798

^aLicensed Storage Capacity is the maximum number of spent nuclear fuel assemblies and canisters to be stored at a given site or nuclear fuel pool, as licensed by the Nuclear Regulatory Commission.

^bMaximum Established Storage Capacity is the maximum established spent fuel capacity for the site defined by the DOE as the maximum number of intact assemblies that will be able to be stored at some point in the future (between the reporting date and the reactor's end of life) taking into account any established or current studies or engineering evaluations, at the time of submittal for licensing approval from the NRC.

^cCurrent Inventory is the number of spent nuclear fuel assemblies stored at a given site or spent nuclear fuel pool.

^dTemporarily discharged assemblies are included in the current inventory column.

^eBrunswick 1 and 2 are BWR reactors with the capability of storing both BWR and PWR fuel assemblies in their storage pools.

^fThe current inventory of assemblies stored in the PWR portion of Brunswick pools came from the Robinson 2 reactor.

^gHarris 1 is a PWR reactor with the capability of storing both PWR and BWR fuel assemblies in its storage pools, based on future needs. The pools are licensed to hold up to 4,184 PWR or 5,808 BWR assemblies.

^hA total of 560 temporarily discharged assemblies were shipped from Long Island Power Authority's Shoreham plant to Limerick 1. Of these, a total of 56 temporarily discharged assemblies were reinserted in core at Limerick 1. See Technical Note 14 in Appendix E.

ⁱLicensed Storage Capacity total and Maximum Established Storage Capacity total assume that Carolina Power and Light Company's Harris 1 site (capable of storing PWR and BWR fuel assemblies), will store BWR assemblies only. Totals assuming PWR assemblies only are 214,118 licensed storage capacity and 215,197 maximum established storage capacity.

^jLicensed Storage Capacity total and Maximum Established Storage Capacity total assume that Carolina Power and Light Company's Harris 1 site and General Electric Company's Morris Operation site (both capable of storing PWR and BWR fuel assemblies), will store BWR assemblies only. Totals assuming PWR assemblies only are 214,631 licensed storage capacity and 215,710 maximum established storage capacity.

MTU = Metric tons of uranium; PWR = Pressurized-water reactor; BWR = Boiling-water reactor.

Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 11. Site Capacities and Inventories at Away-from-reactor Storage Facilities as of December 31, 1994

Storage Facility	Contributing Reactor	Reactor ID	Reactor Type	Pool Site ID	Licensed Storage Capacity ^a	Maximum Established Storage Capacity ^b	Current Inventory ^c	Initial Uranium Content of Pool Inventory (MTU)
Babcock & Wilcox Company (Lynchburg)		--	PWR	7101	4	4	0	0.0
		--	BWR		4	4	0	0.0
General Electric Company (Morris Operation)	San Onofre 1	4701	PWR	6601	^b 380	380	270	98.4
	Haddam Neck	5701	PWR				82	34.5
	Dresden 2	1006	BWR		^b 2,928	2,928	753	^c 145.2
	Cooper Station	3001	BWR				1,054	198.0
	Monticello	3301	BWR				1,058	198.2
Subtotal							3,217	674.3
General Electric Company (Vallecitos Nuclear)		--		6201			0	0.0
Idaho National Engineering Laboratory ^d	Turkey Point 3	1803	PWR	7002	--	--	18	8.2
	^e Surry 1	5203	PWR		--	--	1	0.5
	^e Surry 2	5204	PWR		--	--	68	31.0
	Point Beach 1	5401	PWR		--	--	6	2.4
	Haddam Neck	5701	PWR		--	--	1	0.4
	Dresden 1	1005	BWR		--	--	3	0.3
	Peach Bottom 2	3704	BWR		--	--	2	0.4
Subtotal							99	43.1
Washington (Hanford) ^d	Calvert Cliffs 1	0501	PWR	7007	--	--	2	0.8
	Point Beach 1	5401	PWR		--	--	3	1.2
	Cooper Station	3001	BWR		--	--	2	0.4
Subtotal							7	2.4
West Valley Demonstration Project	Ginna	4401	PWR	7005	^f 40	40	40	15.3
	Big Rock Point	1201	BWR		^f 85	85	85	11.5
Subtotal							125	26.8
Total					^g3,061	^g3,061	3,448	746.6

^aIn number of assemblies (see Glossary for definition).

^bGeneral Electric Company (Morris Operation) is not licensed to receive any more assemblies.

^cValue presented represents an historical change by the utility.

^dThese storage facilities are not surveyed by Form RW-859. The current inventory data for these facilities are shipments to these facilities which were reported by the individual utilities on Form RW-859. See Technical Note 2 in Appendix E. Licensed and maximum established storage capacity data are not applicable to these facilities.

^eSurry 1 and 2 spent fuel stored at Idaho National Engineering Laboratory is in dry storage.

^fWest Valley Demonstration Project is not licensed to receive any more assemblies.

^gLicensed Storage Capacity total and Maximum Established Storage Capacity total assume General Electric Company's Morris Operation site (capable of storing PWR and BWR fuel assemblies), will store BWR assemblies only. Totals assuming PWR assemblies only are 513 licensed storage capacity and 513 maximum established storage capacity.

MTU = Metric tons of uranium; -- = Not applicable; PWR = Pressurized-water reactor; BWR = Boiling-water reactor.

Table 12. Spent Fuel in Storage by State and Storage Site

State	Storage Site	BWR Assemblies	BWR Initial Uranium Content (MTU)	PWR Assemblies	PWR Initial Uranium Content (MTU)	Total Stored Assemblies	Total Initial Uranium Content (MTU)
Alabama	Browns Ferry 1	3,560	660.4	0	0.0	3,560	660.4
	Browns Ferry 3	1,030	191.4	0	0.0	1,030	191.4
	Farley 1	0	0.0	716	330.1	716	330.1
	Farley 2	0	0.0	558	257.4	558	257.4
	Total	4,590	851.9	1,274	587.5	5,864	1,439.4
Arizona	Palo Verde 1	0	0.0	368	151.7	368	151.7
	Palo Verde 2	0	0.0	384	156.5	384	156.5
	Palo Verde 3	0	0.0	380	156.4	380	156.4
	Total	0	0.0	1,132	464.7	1,132	464.7
Arkansas	Arkansas Nuclear 1	0	0.0	684	316.9	684	316.9
	Arkansas Nuclear 2	0	0.0	636	263.9	636	263.9
	Total	0	0.0	1,320	580.8	1,320	580.8
California	Diablo Canyon 1	0	0.0	464	209.4	464	209.4
	Diablo Canyon 2	0	0.0	484	217.7	484	217.7
	Humboldt Bay	390	28.9	0	0.0	390	28.9
	Rancho Seco	0	0.0	493	228.4	493	228.4
	San Onofre 1	0	0.0	207	76.4	207	76.4
	San Onofre 2	0	0.0	662	270.1	662	270.1
	San Onofre 3	0	0.0	710	287.8	710	287.8
	Total	390	28.9	3,020	1,289.7	3,410	1,318.7
Colorado	Fort St. Vrain	0	0.0	0	0.0	^a 1,464	^a 15.4
	Total	0	0.0	0	0.0	^a1,464	^a15.4
Connecticut	Haddam Neck	0	0.0	809	333.3	809	333.3
	Millstone 1	2,304	424.8	0	0.0	2,304	424.8
	Millstone 2	0	0.0	868	342.9	868	342.9
	Millstone 3	0	0.0	332	152.8	332	152.8
	Total	2,304	424.8	2,009	829.1	4,313	1,253.9
Florida	Crystal River 3	0	0.0	608	282.2	608	282.2
	St. Lucie 1	0	0.0	964	363.7	964	363.7
	St. Lucie 2	0	0.0	544	205.9	544	205.9
	Turkey Point 3	0	0.0	640	291.6	640	291.6
	Turkey Point 4	0	0.0	650	296.3	650	296.3
	Total	0	0.0	3,406	1,439.8	3,406	1,439.8
Georgia	Hatch 1	3,919	721.3	0	0.0	3,919	721.3
	Vogtle 1	0	0.0	646	297.5	646	297.5
	Total	3,919	721.3	646	297.5	4,565	1,018.9
Idaho	Idaho National Engineering Laboratory	5	0.7	94	42.5	^a 843	^a 52.0
	Total	5	0.7	94	42.5	^a843	^a52.0
Illinois	Braidwood 1	0	0.0	668	283.6	668	283.6
	Byron 1	0	0.0	864	366.8	864	366.8
	Clinton 1	724	133.2	0	0.0	724	133.2
	Dresden 1	683	69.5	0	0.0	683	69.5
	Dresden 2	2,162	388.0	0	0.0	2,162	388.0
	Dresden 3	2,148	385.9	0	0.0	2,148	385.9
	LaSalle County 1	2,360	433.4	0	0.0	2,360	433.4
	Morris	2,865	541.4	352	132.9	3,217	674.3
	Quad Cities 1	4,284	788.1	0	0.0	4,284	788.1
	Zion 1	0	0.0	1,684	769.1	1,684	769.1
	Total	15,226	2,739.6	3,568	1,552.4	18,794	4,292.0

See footnotes at end of table.

Table 12. Spent Fuel in Storage by State and Storage Site (Continued)

State	Storage Site	BWR Assemblies	BWR Initial Uranium Content (MTU)	PWR Assemblies	PWR Initial Uranium Content (MTU)	Total Stored Assemblies	Total Initial Uranium Content (MTU)
Iowa	Duane Arnold	1,280	235.3	0	0.0	1,280	235.3
	Total	1,280	235.3	0	0.0	1,280	235.3
Kansas	Wolf Creek 1	0	0.0	488	226.0	488	226.0
	Total	0	0.0	488	226.0	488	226.0
Louisiana	River Bend 1	956	175.9	0	0.0	956	175.9
	Waterford 3	0	0.0	520	214.0	520	214.0
	Total	956	175.9	520	214.0	1,476	389.9
Maine	Maine Yankee	0	0.0	1,149	433.0	1,149	433.0
	Total	0	0.0	1,149	433.0	1,149	433.0
Maryland	Calvert Cliffs 1	0	0.0	1,394	533.9	1,394	533.9
	Calvert Cliffs 1 Dry	0	0.0	192	73.9	192	73.9
	Total	0	0.0	1,586	607.8	1,586	607.8
Massachusetts	Pilgrim 1	1,628	301.6	0	0.0	1,628	301.6
	Yankee Rowe	0	0.0	533	127.2	533	127.2
	Total	1,628	301.6	533	127.2	2,161	428.8
Michigan	Big Rock Point	336	44.1	0	0.0	336	44.1
	Cook 1	0	0.0	1,679	738.0	1,679	738.0
	Enrico Fermi 2	900	161.9	0	0.0	900	161.9
	Palisades	0	0.0	745	297.9	745	297.9
	Palisades Dry	0	0.0	48	18.6	48	18.6
	Total	1,236	206.0	2,472	1,054.4	3,708	1,260.4
Minnesota	Monticello	822	146.8	0	0.0	822	146.8
	Prairie Island 1	0	0.0	1,329	500.9	1,329	500.9
	Total	822	146.8	1,329	500.9	2,151	647.7
Mississippi	Grand Gulf 1	1,660	298.5	0	0.0	1,660	298.5
	Total	1,660	298.5	0	0.0	1,660	298.5
Missouri	Callaway	0	0.0	548	240.1	548	240.1
	Total	0	0.0	548	240.1	548	240.1
Nebraska	Cooper Station	804	147.9	0	0.0	804	147.9
	Fort Calhoun	0	0.0	570	205.0	570	205.0
	Total	804	147.9	570	205.0	1,374	353.0
New Hampshire	Seabrook	0	0.0	208	96.3	208	96.3
	Total	0	0.0	208	96.3	208	96.3
New Jersey	Hope Creek	1,240	229.5	0	0.0	1,240	229.5
	Oyster Creek	2,048	374.4	0	0.0	2,048	374.4
	Salem 1	0	0.0	708	326.5	708	326.5
	Salem 2	0	0.0	556	256.4	556	256.4
	Total	3,288	603.9	1,264	582.9	4,552	1,186.8
New York	FitzPatrick	1,888	348.0	0	0.0	1,888	348.0
	Giinna	0	0.0	721	271.2	721	271.2
	Indian Point 1	0	0.0	160	30.6	160	30.6
	Indian Point 2	0	0.0	756	343.9	756	343.9
	Indian Point 3	0	0.0	584	267.6	584	267.6
	Nine Mile Point 1	1,812	335.7	0	0.0	1,812	335.7
	Nine Mile Point 2	640	118.2	0	0.0	640	118.2
	West Valley	85	11.5	40	15.3	125	26.8
	Total	4,425	813.3	2,261	928.6	6,686	1,741.9

See footnotes at end of table.

Table 12. Spent Fuel in Storage by State and Storage Site (Continued)

State	Storage Site	BWR Assemblies	BWR Initial Uranium Content (MTU)	PWR Assemblies	PWR Initial Uranium Content (MTU)	Total Stored Assemblies	Total Initial Uranium Content (MTU)
North Carolina	Brunswick 1	942	174.4	160	71.3	1,102	245.7
	Brunswick 2	891	164.8	144	65.5	1,035	230.4
	Harris 1	1,059	195.4	500	221.2	1,559	416.6
	McGuire 1	0	0.0	651	285.2	651	285.2
	McGuire 2	0	0.0	893	397.6	893	397.6
	Total	2,892	534.7	2,348	1,040.8	5,240	1,575.5
Ohio	Davis-Besse	0	0.0	520	244.2	520	244.2
	Perry 1	972	177.9	0	0.0	972	177.9
	Total	972	177.9	520	244.2	1,492	422.1
Oregon	Trojan	0	0.0	780	358.9	780	358.9
	Total	0	0.0	780	358.9	780	358.9
Pennsylvania	Beaver Valley 1	0	0.0	576	265.6	576	265.6
	Beaver Valley 2	0	0.0	260	120.0	260	120.0
	Limerick 1	2,492	458.9	0	0.0	2,492	458.9
	Peach Bottom 2	2,434	449.0	0	0.0	2,434	449.0
	Peach Bottom 3	2,200	408.2	0	0.0	2,200	408.2
	Susquehanna 1	3,112	555.6	0	0.0	3,112	555.6
	Three Mile Island 1	0	0.0	601	278.9	601	278.9
	Total	10,238	1,871.8	1,437	664.4	11,675	2,536.2
South Carolina	Catawba 1	0	0.0	484	206.6	484	206.6
	Catawba 2	0	0.0	444	188.5	444	188.5
	Oconee 1	0	0.0	1,026	474.8	1,026	474.8
	Oconee 3	0	0.0	528	244.9	528	244.9
	Oconee 1 Dry	0	0.0	696	322.9	696	322.9
	Robinson 2	0	0.0	240	102.0	240	102.0
	Robinson 2 Dry	0	0.0	56	24.1	56	24.1
	Summer	0	0.0	504	225.5	504	225.5
	Total	0	0.0	3,978	1,789.2	3,978	1,789.2
Tennessee	Sequoyah 1	0	0.0	901	415.3	901	415.3
	Watts Bar 1	0	0.0	0	0.0	0	0.0
	Total	0	0.0	901	415.3	901	415.3
Texas	Comanche Peak 1	0	0.0	293	131.8	293	131.8
	South Texas 1	0	0.0	236	127.9	236	127.9
	South Texas 2	0	0.0	188	101.5	188	101.5
	Total	0	0.0	717	361.2	717	361.2
Vermont	Vermont Yankee	1,978	365.9	0	0.0	1,978	365.9
	Total	1,978	365.9	0	0.0	1,978	365.9
Virginia	North Anna 1	0	0.0	1,189	547.3	1,189	547.3
	Surry 1	0	0.0	799	366.1	799	366.1
	Surry 1 Dry	0	0.0	533	241.4	533	241.4
	Total	0	0.0	2,521	1,154.8	2,521	1,154.8
Washington	Hanford	2	0.4	5	2.0	7	2.4
	Washington Nuclear 2	1,196	216.1	0	0.0	1,196	216.1
	Total	1,198	216.5	5	2.0	1,203	218.5

See footnotes at end of table.

Table 12. Spent Fuel in Storage by State and Storage Site (Continued)

State	Storage Site	BWR Assemblies	BWR Initial Uranium Content (MTU)	PWR Assemblies	PWR Initial Uranium Content (MTU)	Total Stored Assemblies	Total Initial Uranium Content (MTU)
Wisconsin	Kewaunee	0	0.0	688	265.0	688	265.0
	LaCrosse	333	38.0	0	0.0	333	38.0
	Point Beach 1	0	0.0	1,306	506.2	1,306	506.2
	Total	333	38.0	1,994	771.1	2,327	809.1
Total		60,144	10,901.3	44,598	19,102.0	104,742	30,003.3
Number of States Storing Spent Fuel		20		31		34	

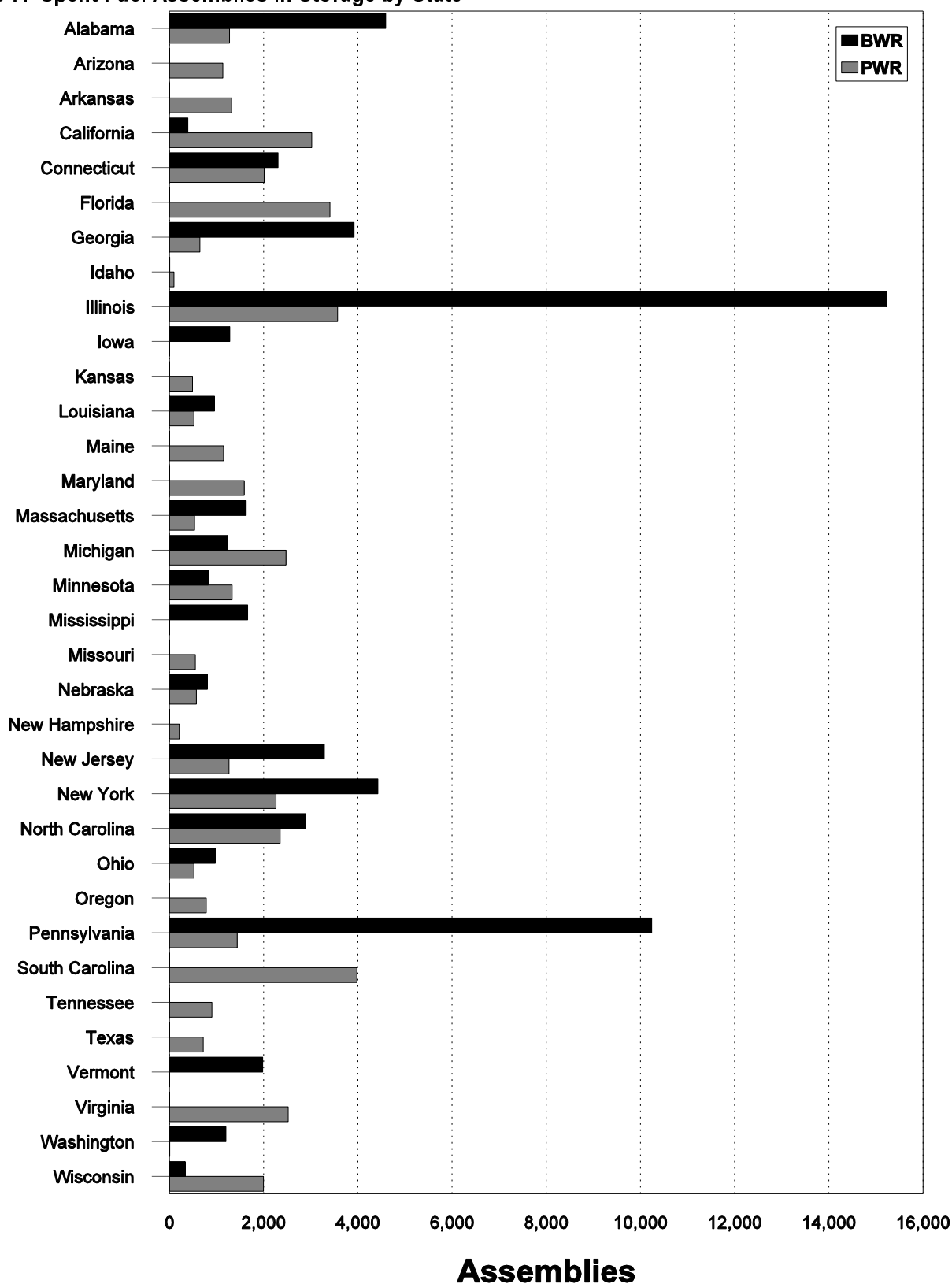
^a A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements are in storage (744 with initial uranium content equal to 8.8 MTU stored in Idaho and 1,464 with initial uranium content equal to 15.4 MTU stored in Colorado). These HTGR fuel elements are not included in the above table totals. See Technical Note 5 in Appendix E.

MTU = Metric tons of uranium; BWR = Boiling-water reactor; PWR = Pressurized-water reactor.

Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Figure 7. Spent Fuel Assemblies in Storage by State

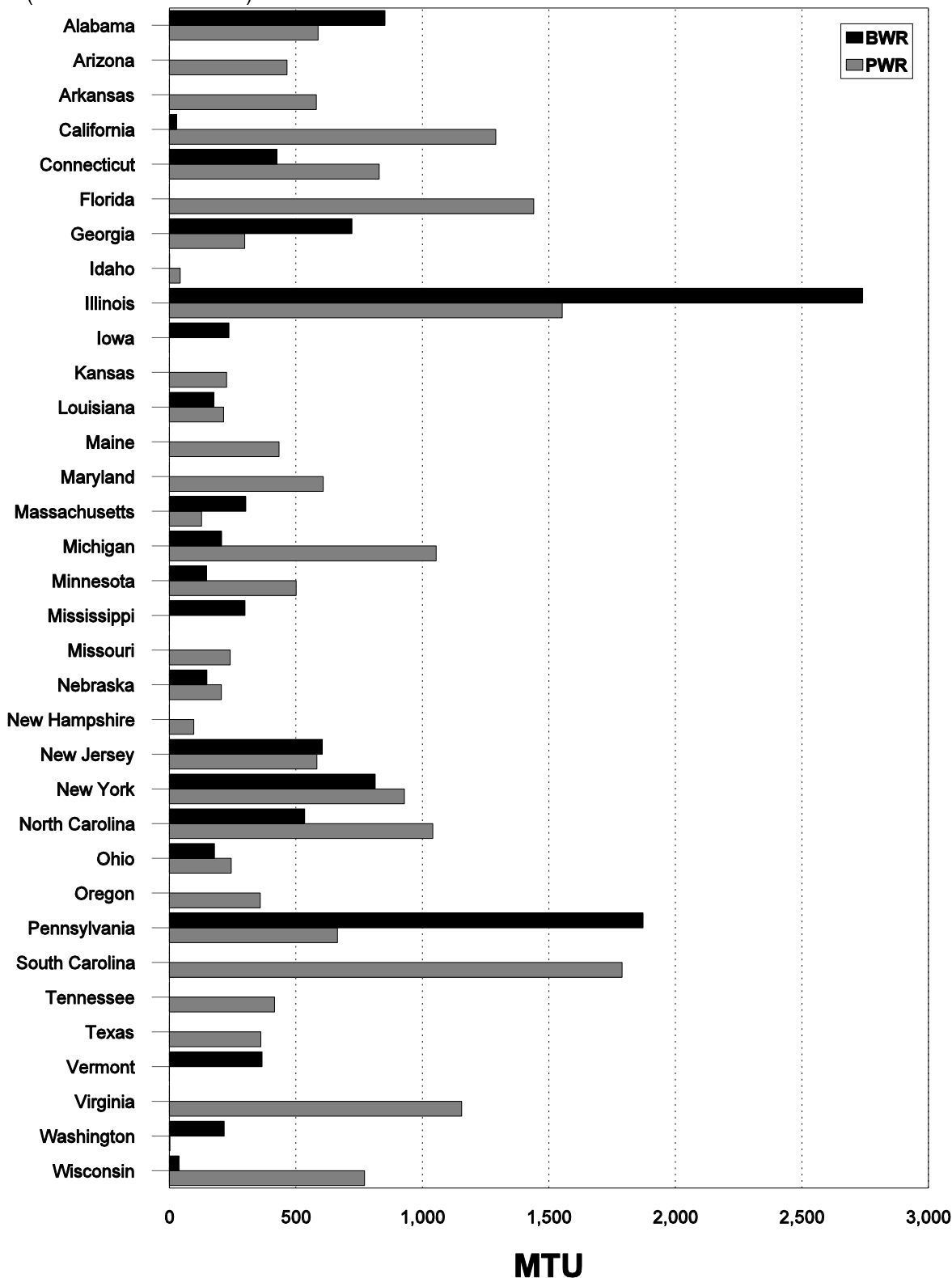


BWR=Boiling-water reactor; PWR=Pressurized-water reactor.

Notes: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements are in storage (744 stored in Idaho and 1,464 in Colorado). These HTGR fuel elements are not reflected on this graph. Numbers in the above graph represent assemblies stored at nuclear power plant sites and away-from-reactor facilities, and include both permanently and temporarily discharged assemblies.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Figure 8. Initial Uranium Content of Spent Fuel Assemblies in Storage by State
(Metric tons of uranium)



BWR=Boiling-water reactor; PWR=Pressurized-water reactor; MTU=metric tons of uranium.

Notes: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements are in storage (744 with initial uranium content equal to 8.8 MTU stored in Idaho and 1,464 with initial uranium content equal to 15.4 MTU stored in Colorado). These HTGR fuel elements are not reflected on this graph. Numbers in the above graph represent the initial uranium content of assemblies stored at nuclear power plant sites and away-from-reactor facilities, and include both permanently and temporarily discharged assemblies.

Dry Storage at Utilities

In order to meet the demand for storage space, several utility companies have opted to increase their spent fuel storage capacity through the use of dry storage techniques. All U.S. commercial LWR's which are storing, or are planning to store nuclear fuel assemblies in an Independent Spent Fuel Storage Installation (ISFSI) as of December 31, 1994, are reported on Form RW-859.

Dry storage inventories and projection trends (Figure 9) are based on information provided on Form RW-859 submission and supplemented by information provided by several utilities. Data on dry storage at each of these utilities and affected reactors (Table 13) and information on the current and projected number of assemblies in dry storage at each of the utilities (Table 14) are found at the end of this chapter. Note that Consumers Power Company's Palisades plant did not have a discharge in 1994 and therefore, was not required to report on the Form RW-859 (See Appendix A). Palisades did, however, move assemblies into dry storage during 1994. The data are included in this chapter, but are not included in dry storage inventory totals.

The design and use of dry storage facilities are regulated by the Nuclear Regulatory Commission (NRC) through federal regulations found in 10 CFR 72. Under these regulations, both the site and dry storage cask design proposed by a utility are reviewed and evaluated. (Only utilities authorized to possess or operate nuclear power reactors under 10 CFR 50 can receive NRC approval for dry storage.) Upon successful completion of the review process, the NRC grants a site-specific license to the utility for use of the proposed dry storage design.

In 1990, 10 CFR 72 Subpart K was modified to allow general licensing of dry storage casks, without the need for a site-specific license. Under this new regulation, NRC approval of dry storage is based upon the granting of a Certificate of Compliance for the specific dry storage cask design. To obtain this certificate, the cask vendor must submit a safety analysis report describing the proposed casks and how it should be used to safely store spent nuclear fuel. Once granted, the Certificate of Compliance is valid for 20 years, and can be renewed. Utilities that choose to use general licensed dry storage casks are required to ensure that there are no safety questions or changes needed to employ the casks at their sites. The utilities also must comply with the cask's Certificate of Compliance and develop operating procedures for use of the casks.

As of January 1995, the NRC granted Certificates of Compliance to seven dry storage systems. General Nuclear Systems, Inc., Westinghouse Electric, NAC International, and Transnuclear, Inc., have NRC Certificates of Compliance for

metal cask dry storage technologies. These dry storage cask technologies include the following: CASTOR V.21; MC-10; NAC S/T; NAC-C28 S/T, and TN-24. The NRC has also granted Certificates of Compliance to VECTRA Technologies, Inc.'s Standardized NUHOMS-24P and NUHOMS-52B and Sierra Nuclear's VSC-24 concrete dry storage systems.

Dry storage technologies that can only be used under site-specific licensing have been developed by the following: Foster Wheeler Energy Applications (Modular Dry Storage); Sierra Nuclear Corporation (TRANSTOR); General Nuclear Systems, Inc. (CASTOR X/33); NAC International (NAC-I28 S/T); VECTRA Technologies, Inc. (NUHOMS-7P, NU-HOMS-MP187); and, Transnuclear, Inc. (TN-32, TN-40).

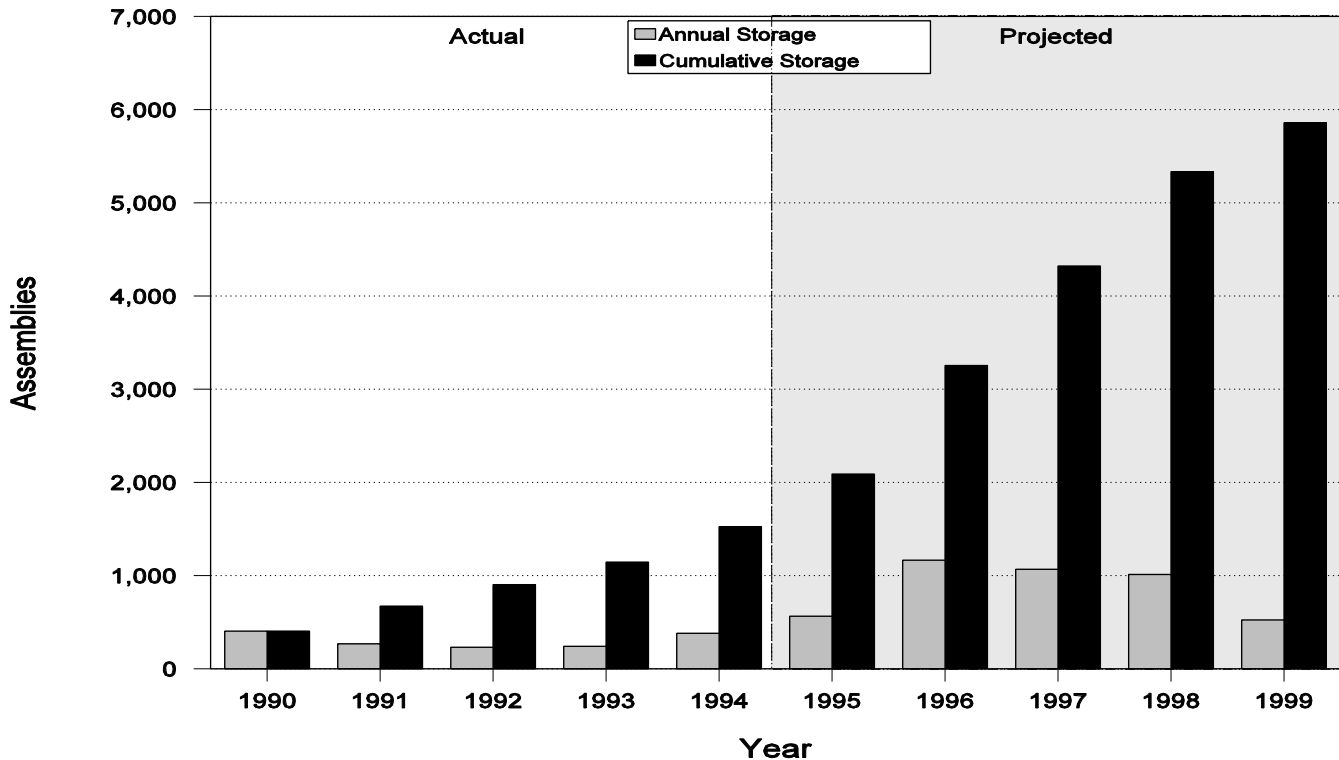
The most widely used dry storage technology in the United States is the Nuclear Horizontal Modular (NUHOMS) spent fuel storage system, designed by VECTRA Technologies, Inc. (formerly Pacific Nuclear). Three utilities currently use the NUHOMS design: Baltimore Gas and Electric Company, Carolina Power and Light Company, and Duke Power Company. Five utilities plan to employ the NUHOMS system: GPU Nuclear Corporation, New York Power Authority, Pennsylvania Power and Light Company, Sacramento Municipal Utility District, and Toledo Edison Company. Sacramento Municipal Utility District's Rancho Seco plant will use the NUHOMS-MP187 multi-purpose cask for on-site transfer, off-site transport, and contingency on-site storage.

Sierra Nuclear's VSC-24 was the first concrete dry storage system to be granted a Certificate of Compliance by the NRC. The VSC-24 dry storage system is in use at Consumers Power Company's Palisades plant and is proposed for use at Arkansas Power and Light Company's Arkansas Nuclear 1 & 2 plants and Wisconsin Electric Power Company's Point Beach plant. Portland General Electric Company's Trojan plant has a contractual agreement for use of Sierra Nuclear's TRANSTOR multi-purpose dry storage cask.

Transnuclear, Inc.'s TN-40 metal cask is approved for site-specific use. In 1995, Northern States Power Company's Prairie Island loaded the first two TN-40 casks at its site in Goodhue County, Minnesota. Virginia Power's Surry and North Anna plants have contractual agreements with Transnuclear for future dry storage with the TN-32 cask.

General Nuclear Systems, Inc.'s CASTOR V/21 and X/33, NAC International's NAC-I28 S/T, and Westinghouse's MC-10 metal casks are in use exclusively at Virginia Power's Surry plant. Foster Wheeler Energy Applications, Inc.'s dry storage modules are only in use at Public Service Company of Colorado's Fort St. Vrain site.

Figure 9. Dry Storage Inventories and Projections



Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).
Utilities that currently have ISFSIs in operation or under consideration are discussed below.

Arkansas Power and Light Company

In 1994, the Arkansas Power and Light Company's Arkansas Nuclear 1 & 2 plants finalized a contractual agreement with Sierra Nuclear for 14 VSC-24 casks that can hold up to 24 PWR assemblies.

Construction of the concrete casks began in October 1994. The cask storage will be on a concrete pad located within the existing security protected area at the Arkansas Nuclear plants. The pad is designed to hold 26 casks, but can be expanded to provide space for an additional 50 casks. Existing rail lines and a new rail car specifically designed for the VSC will transport the casks from the plant's Auxiliary Building to the storage pad.

Baltimore Gas and Electric Company

The ISFSI at Baltimore Gas and Electric Company's Calvert Cliffs station is the NUHOMS-24P. The Calvert Cliffs ISFSI has been designed as a life-of-plant storage facility. The ISFSI will have the capacity to store all spent fuel discharged from Calvert Cliffs 1 & 2, beyond the spent fuel pool capacity, up to the 40-year plant life, if necessary. The exact capacity needed is uncertain, and to limit capital investment

until necessary, the ISFSI will be constructed in up to five phases. The ISFSI required the preparation of a 10 CFR 72 License Application, Safety Analysis Report, Environmental Report, and a Security Plan for NRC review and approval. The license material was prepared and submitted to the NRC in December 1989. Construction of the ISFSI west of the plant began in April 1991 after NRC approved the Environmental Report. The facility and its pre-operational testing were completed in October 1992. The ISFSI was licensed by the NRC on November 25, 1992.

The license allows Baltimore Gas and Electric Company to place as many as 2,880 assemblies in casks to be placed in ISFSI's. Each NUHOMS cask at Calvert Cliffs can hold 24 assemblies, and there are currently 120 planned storage modules. On November 30, 1993, the dry storage facility became fully operational with the successful loading of the first cask of fuel. As of September 1995, a total of 240 assemblies were stored in 10 modules.

Carolina Power and Light Company

The ISFSI for Carolina Power and Light Company's Robinson 2 plant is composed of 8 NUHOMS-7P horizontal storage modules (HSM's). Each HSM is a

steel-reinforced concrete structure which holds 7 intact assemblies in each module. The ISFSI was licensed by the NRC in August 1986 to hold 56 assemblies, and became operational in March 1989. The Carolina Power and Light Company also applied to the NRC for a license for an ISFSI to be built at its Brunswick plant. The ISFSI at the Brunswick plant will be used only as a backup if shipping of spent nuclear fuel to the Harris plant is prohibited.

Consumers Power Company

In April 1993, the NRC granted a Certificate of Compliance to the VSC-24 cask by Sierra Nuclear Corporation and approved use of dry-cask spent fuel storage at Consumers Power Company's Palisades plant. The approval was challenged by the Michigan Attorney General and a citizen organization, the Lake Michigan Federation, on the grounds that the process should have entailed a full environmental impact statement, rather than the less elaborate environmental assessment.

Palisades plant personnel started loading casks on May 7, 1993, and by May 19, 1993, two casks, containing 24 spent fuel assemblies, were welded shut and placed on the storage pad. By May 1995, 11 additional casks were loaded, for a total of 13 loaded casks. The design allows for as many as 25 casks to be used at the plant -- enough to last Palisades through the end of its current licensed life, in 2007.

On August 1, 1994, Consumers Power Company notified the NRC of its plans to unload and replace 1 of the dry storage casks in use at the Palisades plant. Although no leaks were detected, the utility found indications of minor flaws in the welds of the VSC-24 cask during its review of the manufacturer's quality assurance program. The utility stated that even though there was no actual health, engineering, or operational requirements, the cask was to be replaced.

In January 1995, the U.S. Circuit Court of Appeals declined to order the NRC to conduct a full hearing before allowing Consumers Power to continue using dry storage at the Palisades plant.¹ The three judge panel said that the NRC had taken all the necessary steps to safeguard the environment, even though it had not prepared the site-specific analysis. The Appeals Court upheld the NRC's contention that the pad site was included in the environmental impact statement and that the pad site was acceptable for use.

In July 1995, the U.S. Supreme Court denied an appeal by the Michigan Attorney General and two environmental organizations challenging the licensing procedures used in approving the ISFSI.² The denial

upheld the January 1995 decision by the U.S. Circuit Court of Appeals, thus allowing for future use of the ISFSI for spent fuel storage.

Duke Power Company

Duke Power Company received its Oconee site license from the NRC in January 1990 for 88 NUHOMS-24P module. Each module is designed to store 24 pressurized-water reactor (PWR) assemblies; therefore, the maximum capacity is 2,112 assemblies. The first 20 modules were completed in 1990 and the second set of 20 in 1992. The modules were loaded with fuel as follows: 4 modules in 1990, 9 modules in 1991, 7 modules in 1992, 4 modules in 1993, and 5 modules in 1994. As of September 1995, a total of 816 assemblies in 34 modules are stored in Oconee's ISFSI. Duke Power plans to load an average of 5 modules each year from 1996 to 1998.

GPU Nuclear Corporation

GPU Nuclear Corporation contracted VECTRA Technologies, Inc., to engineer, license, and construct a spent fuel storage system for the Oyster Creek nuclear plant. The agreement includes the design and construction of concrete modules for use in storing the plant's spent fuel on-site. The facility will employ the NUHOMS-52B module design. VECTRA Technologies completed engineering and licensing work in 1994 and began delivering the fuel-storage equipment in 1995. Initial loading of the facility is expected in February 1996. Plans are for a total capacity of 20 storage modules (1,040 assemblies). This will be the first dry fuel storage project for BWR fuel in the United States.

New York Power Authority

New York Power Authority's FitzPatrick plant contracted with VECTRA Technologies, Inc. for the design and implementation of a 34 module NUHOMS-52B ISFSI facility. As the NUHOMS-52B is a NRC-approved dry storage system, FitzPatrick's ISFSI does not require a site-specific license. Phase I, which included the design criteria, conceptual design, site selection, and geotechnical investigation, was completed in October 1994.

Northern States Power Company

The decision by the Minnesota Public Utilities Commission to allow 17 containers for aboveground spent fuel storage at Northern States Power Company's Prairie Island site was granted June 26, 1992.³ The number of containers granted for use was considerably less than Northern States Power

¹42 F.3d 1501, *; U.S. App. LEXIS 371, **1; 1995 FED App. 0013P (6th Cir.)

²"The U.S. Supreme Court Denied An Appeal," *Nuclear News* (August 1995), p.84.

³131 Pub. Util. Rep 4th (PUC) 315 (Minn. PUC 1992)

Company's request for 48 casks submitted in April 1991. The Commission found that in light of the uncertain economics of future nuclear generation, dry storage at the plant should be limited to 17 casks.

Without this additional storage, the spent fuel pool would have been full by the end of 1994. The utility estimated that with no additional fuel storage space, the Prairie Island 2 reactor would shut down in May 1995 while the Prairie Island 1 reactor would shut down in January 1996. The 17 casks, although less than the utility requested, would enable the Prairie Island plant to remain in operation through the end of the century.

In July 1993, a Minnesota Supreme Court decision put on hold Northern States Power Company's plans for dry cask storage at Prairie Island.⁴ The State's highest court decided to let stand an Appeals Court decision that overturned the State regulators' approval of the on-site storage plan.⁵ The Court's decision was based on a Minnesota State law, enacted in the 1970's, requiring the State legislature's approval for "permanent" spent fuel storage within Minnesota. The Appeals Court concluded, and the State Supreme Court agreed, that Northern States' dry cask storage option constituted "permanent" storage, thus requiring State legislative approval.

Before the State Supreme Court ruling, Northern States finished all the necessary preparatory site work for the spent fuel casks, including construction of the concrete pads on which the casks would sit. The utility also contracted with Transnuclear, Inc., to purchase seven TN-40 casks. (Cask fabrication was suspended pending approval from the State legislature.) In October 1993, the NRC granted the utility a license for the Prairie Island site to store fuel in up to 48 TN-40 casks.

On May 6, 1994, the Minnesota State legislature approved a bill that authorized Northern States Power Company to store spent fuel in a total of 17 casks at the Prairie Island nuclear station.⁶ In a passing vote of 43-22 in the State Senate and 86-46 in the State House, the legislature allowed the utility to immediately store spent fuel in 5 casks. Storage in the remaining casks will be phased in until all 17 are in use by 1999. The provisions of the bill, however, require that the utility actively seeks methods to produce wind generated energy as well as require the Prairie Island plant be shut down if its generating capacity drops below 55 percent for three consecutive years. The same bill also places a moratorium on the construction of new nuclear power plants throughout the state.

In January 1995, Prairie Island received the TN-40 metal casks to be placed on the 216 x 36 foot dry storage pad. On

May 12, 1995, the day following NRC authorization, Prairie Island loaded the first dry storage cask. The second TN-40 cask was loaded on November 1, 1995.

Pennsylvania Power and Light Company

In December 1994, Pennsylvania Power and Light Company selected the NUHOMS-52B dry fuel storage system for use at the Susquehanna plant. The Susquehanna ISFSI will store up to 105 concrete modules for a total of 5,460 BWR fuel assemblies. The initial order is for 15 dry storage modules for which installation is scheduled in August 1997.

Portland General Electric Company

In July 1995, Portland General Electric Company announced plans to develop an ISFSI at the shutdown Trojan plant using Sierra Nuclear Corporation's TRANSTOR technology. The project includes the design, licensing, and supply of spent fuel storage and transportation system components, including multi-purpose canisters. A total of 36 casks will be used for storage and transportation of spent fuel and other irradiated materials that have resulted from the decommissioning of the plant. A site-specific license will be submitted to the NRC in February 1996. The transfer of fuel is expected to commence in January 1998.

Public Service Company of Colorado

The NRC licensed the ISFSI at Public Service Company of Colorado's closed Fort St. Vrain plant on November 4, 1991. The ISFSI is a Modular Vault Dry Storage System, made up of six air-cooled concrete vaults. The license authorizes storage in the ISFSI of up to 1,482 spent fuel elements, 37 reflector control rod elements, and 6 neutron source elements. In December 1991, the Public Service Company of Colorado transferred 18 elements to its ISFSI. In June 1992, 1,446 elements were transferred to the ISFSI, for a total of 1,464 which now reside in the ISFSI. The reflector elements and neutron source elements were disposed of off-site. The design lifetime of the facility is 40 years, although the current license is limited to 20 years. This facility is designed as a stand alone operation although it currently relies on a portion of the plant's security system.

Sacramento Municipal Utility District

Sacramento Municipal Utility District (SMUD) Rancho Seco plant was permanently shut down in 1989 following a public referendum. As a part of their decommissioning strategy,

⁴1993 Minn. LEXIS 477

⁵501 N.W. 2d 638; 1993 Minn App. LEXIS 600

⁶"Legislature: Prairie Island ISFSI can proceed," *Nuclear News* (June 1994), p.26.

SMUD chose to establish an on-site dry storage facility at the Rancho Seco plant.

SMUD first applied to the NRC for an ISFSI site license in October 1991. A revised application was submitted in October 1993. The ISFSI design will be similar to the Oconee and Calvert Cliffs plant's: the NUHOMS-24P storage module. Twenty-one concrete storage modules are planned for the ISFSI facility with a total capacity of 504 assemblies. One storage canister is specially designed for failed fuel assemblies. Full transfer of spent fuel from the pool to the dry storage facility is expected to commence in June 1996, with completion expected in early 1997.

SMUD was also the first utility to apply for a transportable storage system license under 10 CFR 71. This license will allow for the transportation of casks to an off-site repository.

Toledo Edison Company

Toledo Edison Company chose to build an ISFSI at its Davis-Besse plant with an existing NRC-approved cask design. In the spring of 1993, Toledo Edison signed a contract with VECTRA Technologies, Inc., for the design and fabrication of NUHOMS-24P casks at the Davis-Besse plant. The contract will allow for additional on-site storage to support the plant through its current operating license term. The utility plans to load the first fuel into the casks by the end of 1995. The ISFSI will store up to 30 casks with a total capacity of 720 fuel assemblies.

Virginia Power

Virginia Power was the first U.S. utility to use dry storage for spent nuclear fuel. The Virginia Power ISFSI, located at the Surry Power plant, was licensed by the NRC in July 1986 to use the CASTOR V/21 storage cask. Use of the MC-10, NAC-I28/ST, and CASTOR X/33 storage casks has also been approved for site-specific use by the NRC. Each cask is 16 feet high, 8 feet in diameter, and weighs 110 to 120 tons when loaded with fuel. These four cask designs hold between 21 and 33 fuel assemblies. The casks sit on a pad 230 feet long, 32 feet wide, and 3 feet thick (reinforced concrete). Each pad will hold 28 casks, and the facility license provides for 3 pads.

By the end of 1994, a total of 533 assemblies were stored in 24 casks. Virginia Power projects the storage of 84 assemblies in 4 casks during 1995; 117 assemblies in 4 casks during 1996; 96 assemblies in 3 casks during 1997; and, 96 assemblies in 3 casks during 1998. The ISFSI has been licensed to hold up to 1,764 assemblies. For future dry storage needs, Virginia Power has ordered 9 Transnuclear TN-32 casks for delivery to Surry between 1996 and 1998.

In May 1995, Virginia Power submitted an application to the NRC for dry storage at its North Anna plant. Without dry storage, North Anna's spent fuel pool would run out of storage space in 1999. Virginia Power announced that it would employ Transnuclear, Inc.'s TN-32 cask design. Virginia Power has ordered 5 TN-32 casks for use at the North Anna plant. Construction is planned to begin in May 1997, with the first storage plans proposed for August 1998.

Wisconsin Electric Power Company

On August 8, 1994, the final environmental impact statement (EIS) was completed for Wisconsin Electric Power Company's plans for dry storage at the Point Beach reactor site. The EIS, produced by the Public Service Commission of Wisconsin (PSCW), supported the use of steel-reinforced concrete cylinders as a temporary dry storage system. The conclusion was consistent with internal analysis by Wisconsin Electric as well as with the findings of the NRC's storage system licensing process.

After three weeks of public hearings and review of both the draft and final environmental impact statements, the PSCW voted in favor of dry storage at Point Beach.⁷ Without the additional storage, the spent fuel pools would have run out of room by 1998. The ISFSI will allow for storage through the end of reactors' current licenses.

Wisconsin Electric has chosen Sierra Nuclear Corporation VSC-24 concrete cask design. Although the utility does not have a contract with Sierra Nuclear for a specific number of casks, the facility is sized to accommodate 48 casks. The utility currently has plans to load 1 cask in 1995, 2 casks in 1996, 5 casks in 1997, and 4 casks in 1998.

⁷"Wisconsin PSC okays Point Beach dry casks," *Nuclear News* (February 1995), pp.54-55.

Table 13. Independent Spent Fuel Storage Installation (ISFSI) Data

Electric Utility Name	Reactor	Date License Issued/ Submitted	Vendor	Storage Type	Model	Planned Capacity ^a		
						No. of Modules	Assemblies per Module	Total
Arkansas Power and Light Company	Arkansas Nuclear 1 & 2	^b General	Sierra Nuclear Corporation	Concrete Cask	VSC-24	14	24	336
Baltimore Gas and Electric Company	Calvert Cliffs 1 & 2	11/92	VECTRA Technologies, Inc.	Concrete Module	NUHOMS-24P	120	24	2,880
Carolina Power and Light Company	Brunswick 1 & 2	^c 05/89	VECTRA Technologies, Inc.	Concrete Module	NUHOMS-7P	44	7	308
Carolina Power and Light Company	Robinson 2	08/86	VECTRA Technologies, Inc.	Concrete Module	NUHOMS-7P	8	7	56
Consumers Power Company	Palisades	^c 03/90	Sierra Nuclear Corporation	Concrete Cask	VSC-24	24	24	576
Duke Power Company	Oconee 1,2,3	01/90	VECTRA Technologies, Inc.	Concrete Module	NUHOMS-24P	88	24	2,112
GPU Nuclear Corporation	Oyster Creek	^b General	VECTRA Technologies, Inc.	Concrete Module	NUHOMS-52B	20	52	1,040
New York Power Authority	FitzPatrick	^b General	VECTRA Technologies	Concrete Module	NUHOMS-52B	34	52	1,768
Northern States Power Company	Prairie Island 1 & 2	10/93	Transnuclear, Inc.	Metal Cask	TN-40	17	40	680
Pennsylvania Power and Light Company	Susquehanna 1 & 2	^b General	VECTRA Technologies, Inc.	Concrete Module	NUHOMS-52B	105	52	5,460
Portland General Electric Company	Trojan	^c 02/96	Sierra Nuclear Corporation	Concrete Module	TRANSTOR	36	24	864
Public Service Company of Colorado	Fort St. Vrain	11/91	Foster Wheeler Energy Applications, Inc.	Concrete Vault	Modular Dry Storage	6	244	1,464

Table 13. Independent Spent Fuel Storage Installation (ISFSI) Data (Continued)

Electric Utility Name	Reactor	Date License Issued/ Submitted	Vendor	Storage Type	Model	Planned Capacity ^a		
						No. of Modules	Assemblies per Module	Total
Sacramento Municipal Utility District	Rancho Seco	08/94	VECTRA Technologies, Inc.	Concrete Module	NUHOMS-24P	21	24	504
Toledo Edison Company	Davis-Besse	^b General	VECTRA Technologies, Inc.	Concrete Module	NUHOMS-24P	30	24	720
Virginia Power	North Anna 1 & 2	^c 05/95	Transnuclear, Inc.	Metal Cask	TN-32	5	32	160
Virginia Power	Surry 1 & 2	07/86	General Nuclear Systems, Inc.	Metal Cask	CASTOR V/21	25	21	525
			General Nuclear Systems, Inc.	Metal Cask	CASTOR X/33	1	33	33
			Westinghouse	Metal Cask	MC-10	1	24	24
			NAC International	Metal Cask	NAC-I28 S/T	2	28	56
			Transnuclear, Inc.	Metal Cask	TN-32	9	32	288
			Total Surry 1 & 2			38		926
Wisconsin Electric Power Company	Point Beach 1 & 2	^b General	Sierra Nuclear Corporation	Concrete Cask	VSC-24	12	24	288

^aPlanned Capacity is based on contractual agreement with vendors.

^bThe model of dry storage employed by the utilities has been granted a certificate of compliance by the Nuclear Regulatory Commission (NRC) thus eliminating the requirement for a site-specific license.

^cDate license application was/will be submitted to the NRC.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 14. Dry Spent Fuel Storage Data and Projections

Electric Utility Name	Reactor	Assemblies Stored						Total MTU ^a	Projected Assemblies Stored				
		1990	1991	1992	1993	1994	Total		1995	1996	1997	1998	1999
Arkansas Power and Light Company	Arkansas Nuclear 1 & 2	--	--	--	--	--	--	--		144	192		
Baltimore Gas and Electric Company	Calvert Cliffs 1 & 2	--	--	--	48	144	192	73.9	144	144	144	144	
Carolina Power and Light Company	Brunswick 1 & 2	--	--	--	--	--	--	--					
Carolina Power and Light Company	Robinson 2	^b 56	--	--	--	--	56	24.1					
Consumers Power Company	Palisades	--	--	--	48	^c 144	48	18.6		72			
Duke Power Company	Oconee 1,2,3	96	216	168	96	120	696	322.9	120	144	96	120	
GPU Nuclear Corporation	Oyster Creek	--	--	--	--	--	--	--		416			
New York Power Authority	FitzPatrick	--	--	--	--	--	--	--					
Northern States Power Company	Prairie Island 1 & 2	--	--	--	--	--	--	--	120	80	160	200	200
Pennsylvania Power and Light Company	Susquehanna 1 & 2	--	--	--	--	--	--	--			260	260	260
Portland General Electric Company	Trojan	--	--	--	--	--	--	--					
Public Service Company of Colorado	Fort St. Vrain	--	--	^d 1,446	--	--	^d 1,464	^d 15.4					
Sacramento Municipal Utility District	Rancho Seco	--	--	--	--	--	--	--					
Toledo Edison Company	Davis-Besse	--	--	--	--	--	--	--	72				

See footnotes at end of table.

Table 14. Dry Spent Fuel Storage Data and Projections (Continued)

Electric Utility Name	Reactor	Assemblies Stored						Total MTU ^a	Projected Assemblies Stored				
		1990	1991	1992	1993	1994	Total		1995	1996	1997	1998	1999
Virginia Power	North Anna 1 & 2	--	--	--	--	--	--	--				96	64
Virginia Power	Surry 1 & 2	^b 252	52	63	49	117	^c 533	^e 241.4	84	117	96	96	
Wisconsin Electric Power Company	Point Beach 1 & 2	--	--	--	--	--	--	--	24	48	120	96	
Total		^b 404	268	231	241	381	1,525	680.9	564	1,165	1,068	1,012	524

^aInitial uranium content in metric tons of uranium (MTU) of assemblies in dry storage as of December 31, 1994.

^bAssemblies in dry storage through 1990.

^cConsumers Power Company's Palisades plant was not required to report on the 1994 Form RW-859. See Appendix A. These data are not included in the table totals.

^dA total of 1,464 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 15.4 MTU are *not* included in the table totals. See Technical Note 6 in Appendix E.

^eTotal does not include 69 assemblies, with initial uranium content equal to 31.5 MTU, in dry storage at Idaho National Engineering Laboratory.

-- = Not applicable.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

3. Canisters and Nonfuel Components

Background

The Form RW-859 "Nuclear Fuel Data" survey was revised in 1991 to include approximately 30 data elements on canisters and their contents, and nonfuel components (NFC) for each storage pool site. For the past four years, the Energy Information Administration (EIA) has collected these data as part of this survey. This chapter presents the most current data on canisters and NFC stored at these facilities as of December 31, 1994. The results obtained thus far in the area of canisters and nonfuel components present a framework from which further data will be collected.

The storage of canisters and nonfuel assembly (NFA) hardware and their subsequent impact on the Civilian Radio-active Waste Management System (CRWMS) has been the subject of much discussion because of their effect on waste acceptance procedures and transportation and disposal requirements. The number of canisters stored at utilities affects the available spent fuel pool storage space, as well as impacts the total volume of waste destined for disposal. NFA hardware, if integral to a fuel assembly, could represent an addition to the total weight of each shipment. This additional weight may have impacts on the ability of fully loaded transportation casks to meet legal weight limits.

When analyzing canister data provided by utilities on Form RW-859, a number of discrepancies occurred due to differences in the utility and EIA definition of canisters, and the misinterpretation of questions. These discrepancies were particularly apparent in the assessment of the total number of baskets reported by each utility in which the basket total may have been already accounted for in the total number of canisters.

Because the NFC section of the Form RW-859 is a recent addition to the survey, respondent may have interpreted questions differently. This is particularly apparent with respect to the number of fuel channels reported at BWR reactors. While some of these reactors report a number of fuel channels which are roughly equivalent to the number of discharged fuel assemblies, other reactors report quantities which are significantly lower and appear to represent the number of fuel channels which are not attached to assemblies. These differences in reporting must be understood and eventually reconciled in order to accurately estimate quantities which might be designated for disposal.

The Form RW-859 survey is currently being revised so that more thorough and consistent data can be collected in these areas. The need for further information will depend on the level of detail required by designers and systems engineers to plan for the handling and disposition of these components.

Canister and Nonfuel Component Data Through 1994

As of December 31, 1994, a total of 287 canisters were reported in storage pools. Inventories were not reported for 9 of these canisters, representing 3 percent of the total. An additional 300 open baskets containing miscellaneous spent nuclear fuel (SNF) and nonfuel materials were also reported. All of the 287 canisters meet the dimensional envelope requirements specified for disposal of "standard fuel" under the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (10 CFR 961) while most of the baskets do not.

A total of 65,190 pieces of NFA hardware were reported in storage at reactor sites. This total represents the NFA hardware reported by the owners of 100 of the 108 reactors in generic assembly classes (e.g., Babcock & Wilcox 15 X 15, Westinghouse 17 X 17, General Electric 4, 5, 6, Combustion Engineering (CE) System 80, etc.). The remaining 8 reactors either did not report nonfuel components data or reported no NFA hardware components. This chapter addresses the nonfuel components (including NFA hardware) reported by owners of reactors in single-reactor assembly classes (e.g., Big Rock Point, Dresden 1, Palisades, LaCrosse, etc.) separately at the end of this chapter.

Canisters

A canister is a container which may hold spent nuclear fuel, high-level radioactive waste, or nonfuel components. A canister may contain an intact spent fuel assembly, consolidated spent fuel assemblies, spent fuel rods or pieces, NFA hardware, nonfuel disassembly hardware, or other fuel and nonfuel material. These canisters are temporarily stored in spent fuel pools at reactor sites and occupy one or more slots in the pool. When full, a canister is typically closed with

a lid and sealed shut. Waste may also be placed in rodlet or garbage and debris baskets, which are also stored in the spent fuel pools, but not necessarily in the pool racks.

Because many utilities face spent fuel storage constraints, the number of canisters stored at these facilities and the contents of these canisters are important concerns. A few utilities have used fuel consolidation campaigns as a means of placing more than one fuel assembly into a canister that will fill only one storage pool slot. Fuel is consolidated by removing rods from fuel assemblies and placing them in a canister with spacing closer than that of an intact assembly.

A summary of data on canisters, baskets, and their contents as reported on the Form RW-859 survey are presented by storage pool site (Table 15). Due to different reporting schedules, not all respondents were required to report on the 1994 Form RW-859 survey, so data for 28 storage pool sites have been carried over from 1993. In addition, one site did not report canister data for the past four survey years. Of the 287 canisters reported, 145 contain only spent fuel (intact assemblies, consolidated assemblies, or fuel rods/pieces), 101 contain only nonfuel components, 19 contain both fuel and nonfuel, and 22 canisters are

currently empty. The specific contents of 9 canisters were not reported so these tables should not be considered representative of the complete enumeration of these data. A total of 300 open baskets were also reported, containing miscellaneous fuel and nonfuel materials, garbage and debris.

The 164 canisters containing SNF can be further subdivided by whether the fuel was irradiated in a boiling-water reactor (BWR) or pressurized-water reactor (PWR) (Table 16). Of the 48 canisters containing BWR spent nuclear fuel, 23 contain intact spent fuel assemblies, and 25 contain fuel rods. No fuel was consolidated at any BWR. Of the 116 canisters containing PWR spent nuclear fuel, 19 contain intact assemblies, 62 contain fuel rods, and 31 canisters contain a total of 57 consolidated assemblies. These consolidation campaigns took place at Oconee 1 & 2, Millstone 2, Prairie Island 1 & 2, and Ginna. The contents of 4 canisters at PWR's were not reported.

Of the 120 canisters containing nonfuel components (Table 17), a majority contained nonfuel components (56 canisters). The contents of 5 nonfuel canisters were not reported so this table should not be considered representative of the complete enumeration of these data. It should be noted that nonfuel canisters may include more than one class of components.

Table 15. Container Data as of December 31, 1994

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Canisters				Total Canisters	Baskets ^a
				Only Fuel	Only Nonfuel	Both Fuel & Nonfuel	Empty		
Alabama Power Company	Farley 1	PWR	0101	0	0	0	0	0	1
	Farley 2	PWR	0102	0	0	0	0	0	0
Arizona Public Service Company	Palo Verde 1	PWR	0301	2	5	1	2	10	0
	Palo Verde 2	PWR	0302	2	6	0	0	8	0
	Palo Verde 3	PWR	0303	1	4	0	1	6	6
Arkansas Power and Light Company	Arkansas Nuclear 1	PWR	0401	0	0	0	0	0	22
	Arkansas Nuclear 2	PWR	0402	1	0	0	0	1	16
Baltimore Gas and Electric Company	Calvert Cliffs 1 & 2	PWR	0501	0	21	0	0	21	2
Boston Edison Company	Pilgrim 1	BWR	0601	1	0	0	0	1	0
Carolina Power and Light Company	Brunswick 1	BWR	0701	1	0	0	0	1	1
	Brunswick 2	BWR	0702	1	0	0	0	1	0
	Harris 1	PWR	0703	1	1	0	0	2	1
	Robinson 2	PWR	0705	1	2	0	0	3	0
Cleveland Electric Illuminating Company	Perry 1	BWR	0901	3	0	0	1	4	2
Commonwealth Edison Company	Braidwood 1 & 2	PWR	1001	1	3	0	3	7	1
	Byron 1 & 2	PWR	1003	4	0	0	1	5	1
	Dresden 1	BWR	1005	1	0	0	0	1	1
	Dresden 2	BWR	1006	1	0	0	0	1	1
	Dresden 3	BWR	1007	2	0	0	0	2	2
	LaSalle County 1 & 2	BWR	1008	1	0	0	0	1	0
	Quad Cities 1 & 2	BWR	1010	3	0	0	0	3	0
	Zion 1 & 2	PWR	1012	3	2	0	1	6	5
Consolidated Edison Company of New York	Indian Point 1	PWR	1101	0	0	0	0	0	0
	Indian Point 2	PWR	1102	0	0	0	0	0	1
Consumers Power Company	Big Rock Point	BWR	1201	7	0	0	0	7	4
	Palisades	PWR	1204	7	0	0	0	7	0

Table 15. Container Data as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Canisters				Total Canisters	Baskets ^a
				Only Fuel	Only Nonfuel	Both Fuel & Nonfuel	Empty		
See footnotes at end of table.									
Dairyland Power Cooperative	LaCrosse	BWR	1301	0	0	0	0	0	1
Detroit Edison Company	Enrico Fermi 2	BWR	1402	0	4	0	0	4	0
Duke Power Company	Catawba 1	PWR	1501	0	0	0	0	0	0
	Catawba 2	PWR	1502	1	0	0	0	1	0
	McGuire 1	PWR	1504	2	1	0	0	3	0
	McGuire 2	PWR	1505	1	0	0	0	1	0
	Oconee 1 & 2	PWR	1506	6	0	0	0	6	0
	Oconee 3	PWR	1508	0	0	0	0	0	0
Duquesne Light Company	Beaver Valley 1	PWR	1601	3	1	0	7	11	3
	Beaver Valley 2	PWR	1602	1	1	0	0	2	2
Florida Power Corporation	Crystal River 3	PWR	1701	1	1	0	0	2	2
Florida Power and Light Company	St. Lucie 1	PWR	1801	1	4	0	0	5	4
	St. Lucie 2	PWR	1802	1	1	0	0	2	2
	Turkey Point 3	PWR	1803	1	0	0	0	1	4
	Turkey Point 4	PWR	1804	0	0	0	0	0	1
Georgia Power Company	Hatch 1 & 2	BWR	2001	0	0	0	0	0	9
	Vogtle 1 & 2	PWR	2003	0	0	0	0	0	1
GPU Nuclear Corporation	Three Mile Island 1	PWR	1901	0	0	0	0	0	8
	Oyster Creek	BWR	1903	18	0	0	0	18	0
Gulf States Utilities Company	River Bend 1	BWR	2101	0	0	0	0	0	0
Houston Lighting and Power Company	South Texas 1	PWR	2201	0	1	0	4	5	1
	South Texas 2	PWR	2202	0	0	0	2	2	2
IES Utilities, Inc.	Duane Arnold	BWR	2401	0	0	0	0	0	0
Illinois Power Company	Clinton 1	BWR	2301	0	0	0	0	0	1
Indiana Michigan Power Company	Cook 1 & 2	PWR	5801	0	0	0	0	0	9

Table 15. Container Data as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Canisters				Total Canisters	Baskets ^a
				Only Fuel	Only Nonfuel	Both Fuel & Nonfuel	Empty		
Kansas Gas and Electric Company	Wolf Creek 1	PWR	2501	0	0	0	0	0	3
Long Island Power Authority	Shoreham	BWR	2601	0	0	0	0	0	0
Louisiana Power and Light Company	Waterford 3	PWR	2701	0	2	2	0	4	0
Maine Yankee Atomic Power Company	Maine Yankee	PWR	2801	2	14	0	0	16	5
Nebraska Public Power District	Cooper Station	BWR	3001	0	0	0	0	0	0
New York Power Authority	FitzPatrick	BWR	3901	0	0	0	0	0	1
	Indian Point 3	PWR	3902	0	0	0	0	0	1
Niagara Mohawk Power Corporation	Nine Mile Point 1	BWR	3101	0	0	0	0	0	0
	Nine Mile Point 2	BWR	3102	0	0	0	0	0	0
North Atlantic Energy Service Corporation	Seabrook	PWR	5901	0	0	0	0	0	0
Northeast Utilities Service Company	Millstone 1	BWR	3201	1	0	0	0	1	0
	Millstone 2	PWR	3202	6	4	0	0	10	14
	Millstone 3	PWR	3203	0	0	0	0	0	2
	Haddam Neck	PWR	5701	4	4	1	0	9	5
Northern States Power Company	Monticello	BWR	3301	0	0	0	0	0	0
	Prairie Island 1 & 2	PWR	3302	20	2	0	0	22	0
Omaha Public Power District	Fort Calhoun	PWR	3401	0	0	0	0	0	0
Pacific Gas and Electric Company	Diablo Canyon 1	PWR	3501	0	0	0	0	0	0
	Diablo Canyon 2	PWR	3502	1	0	0	0	1	1
	Humboldt Bay	BWR	3503	1	0	0	0	1	7

Table 15. Container Data as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Canisters				Total Canisters	Baskets ^a
				Only Fuel	Only Nonfuel	Both Fuel & Nonfuel	Empty		
PECO Energy Company	Limerick 1 & 2	BWR	3701	0	0	1	0	1	4
	Peach Bottom 2	BWR	3704	0	0	2	0	2	4
	Peach Bottom 3	BWR	3705	1	0	0	0	1	11
Pennsylvania Power and Light Company	Susquehanna 1 & 2	BWR	3601	1	0	0	0	1	1
Portland General Electric Company	Trojan	PWR	3801	1	10	11	0	22	0
Public Service Company of Colorado	Fort St. Vrain	HTGR	4101	0	0	0	0	0	0
Public Service Electric and Gas Company	Hope Creek	BWR	4201	0	0	0	0	0	0
	Salem 1	PWR	4202	0	0	0	0	0	18
	Salem 2	PWR	4203	0	0	0	0	0	7
Rochester Gas and Electric Company	Ginna	PWR	4401	8	2	0	0	10	4
Sacramento Municipal Utility District	Rancho Seco	PWR	4501	0	0	0	0	0	0
South Carolina Electric and Gas Company	Summer	PWR	4601	0	0	0	0	0	0
Southern California Edison Company	San Onofre 1	PWR	4701	0	0	0	0	0	4
	San Onofre 2	PWR	4702	0	0	0	0	0	9
	San Onofre 3	PWR	4703	0	0	0	0	0	10
System Energy Resources, Inc.	Grand Gulf 1	BWR	2901	1	0	0	0	1	18
Tennessee Valley Authority	Browns Ferry 1 & 2	BWR	4803	1	0	0	0	1	0
	Browns Ferry 3	BWR	4805	0	0	0	0	0	0
	Sequoyah 1 & 2	PWR	4808	0	0	0	0	0	0
	Watts Bar 1	PWR	4810	0	0	0	0	0	0

See footnotes at end of table.

Table 15. Container Data as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Canisters				Total Canisters	Baskets ^a
				Only Fuel	Only Nonfuel	Both Fuel & Nonfuel	Empty		
Toledo Edison Company	Davis-Besse	PWR	5001	1	3	0	0	4	4
TU Electric	Comanche Peak 1 & 2	PWR	4901	0	0	0	0	0	23
Union Electric Company	Callaway	PWR	5101	1	0	0	0	1	1
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	BWR	6001	0	0	0	0	0	0
Virginia Power	North Anna 1 & 2	PWR	5201	1	2	0	0	3	3
	Surry 1 & 2	PWR	5203	1	0	1	0	2	8
Washington Public Power Supply System	Washington Nuclear 2	BWR	5302	0	0	0	0	0	1
Wisconsin Electric Power Corporation	Point Beach 1 & 2	PWR	5401	13	0	0	0	13	14
Wisconsin Public Service Corporation	Kewaunee	PWR	5501	0	0	0	0	0	0
Yankee Atomic Electric Company	Yankee Rowe	PWR	5601	0	0	0	0	0	0
Total				145	101	19	22	287	300

^aBaskets column represents the number of open baskets, including rodlet or garbage and debris baskets. Due to reporting errors, the number of baskets reported may be duplicated in canister data.

PWR=Pressurized-water reactor; BWR=Boiling-water reactor; HTGR=High-temperature, gas-cooled reactor.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 16. Canisters Containing Spent Fuel as of December 31, 1994

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Fuel Canisters Containing					Total Fuel Canisters ^c
				Intact Assemblies	Rods and Pieces ^a	Consolidated Assemblies	Number of Consolidated Assemblies	Unknown Contents ^b	
Alabama Power Company	Farley 1	PWR	0101	0	0	0	0	0	0
	Farley 2	PWR	0102	0	0	0	0	0	0
Arizona Public Service Company	Palo Verde 1	PWR	0301	0	3	0	0	0	3
	Palo Verde 2	PWR	0302	0	2	0	0	0	2
	Palo Verde 3	PWR	0303	0	1	0	0	0	1
Arkansas Power and Light Company	Arkansas Nuclear 1	PWR	0401	0	0	0	0	0	0
	Arkansas Nuclear 2	PWR	0402	0	1	0	0	0	1
Baltimore Gas and Electric Company	Calvert Cliffs 1 & 2	PWR	0501	0	0	0	0	0	0
Boston Edison Company	Pilgrim 1	BWR	0601	1	0	0	0	0	1
Carolina Power and Light Company	Brunswick 1	BWR	0701	0	1	0	0	0	1
	Brunswick 2	BWR	0702	0	1	0	0	0	1
	Harris 1	PWR	0703	0	1	0	0	0	1
	Robinson 2	PWR	0705	0	1	0	0	0	1
Cleveland Electric Illuminating Company	Perry 1	BWR	0901	2	1	0	0	0	3
Commonwealth Edison Company	Braidwood 1 & 2	PWR	1001	0	1	0	0	0	1
	Byron 1 & 2	PWR	1003	4	0	0	0	0	4
	Dresden 1	BWR	1005	0	1	0	0	0	1
	Dresden 2	BWR	1006	0	1	0	0	0	1
	Dresden 3	BWR	1007	0	2	0	0	0	2
	LaSalle County 1 & 2	BWR	1008	0	1	0	0	0	1
	Quad Cities 1 & 2	BWR	1010	0	3	0	0	0	3
Consolidated Edison Company of New York	Zion 1 & 2	PWR	1012	1	2	0	0	0	3
	Indian Point 1	PWR	1101	0	0	0	0	0	0
	Indian Point 2	PWR	1102	0	0	0	0	0	0
Consumers Power Company	Big Rock Point	BWR	1201	0	7	0	0	0	7
	Palisades	PWR	1204	0	7	0	0	0	7

Table 16. Canisters Containing Spent Fuel as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Fuel Canisters Containing					Total Fuel Canisters ^c
				Intact Assemblies	Rods and Pieces ^a	Consolidated Assemblies	Number of Consolidated Assemblies	Unknown Contents ^b	
See footnotes at end of table.									
Dairyland Power Cooperative	LaCrosse	BWR	1301	0	0	0	0	0	0
Detroit Edison Company	Enrico Fermi 2	BWR	1402	0	0	0	0	0	0
Duke Power Company	Catawba 1	PWR	1501	0	0	0	0	0	0
	Catawba 2	PWR	1502	0	1	0	0	0	1
	McGuire 1	PWR	1504	0	2	0	0	0	2
	McGuire 2	PWR	1505	0	1	0	0	0	1
	Oconee 1 & 2	PWR	1506	0	4	2	4	0	6
	Oconee 3	PWR	1508	0	0	0	0	0	0
Duquesne Light Company	Beaver Valley 1	PWR	1601	2	1	0	0	0	3
	Beaver Valley 2	PWR	1602	0	1	0	0	0	1
Florida Power Corporation	Crystal River 3	PWR	1701	0	1	0	0	0	1
Florida Power and Light Company	St. Lucie 1	PWR	1801	0	0	0	0	1	1
	St. Lucie 2	PWR	1802	0	0	0	0	1	1
	Turkey Point 3	PWR	1803	0	0	0	0	1	1
	Turkey Point 4	PWR	1804	0	0	0	0	0	0
Georgia Power Company	Hatch 1 & 2	BWR	2001	0	0	0	0	0	0
	Vogtle 1 & 2	PWR	2003	0	0	0	0	0	0
GPU Nuclear Corporation	Three Mile Island 1	PWR	1901	0	0	0	0	0	0
	Oyster Creek	BWR	1903	18	0	0	0	0	18
Gulf States Utilities Company	River Bend 1	BWR	2101	0	0	0	0	0	0
Houston Lighting and Power Company	South Texas 1	PWR	2201	0	0	0	0	0	0
	South Texas 2	PWR	2202	0	0	0	0	0	0
IES Utilities, Inc.	Duane Arnold	BWR	2401	0	0	0	0	0	0
Illinois Power Company	Clinton 1	BWR	2301	0	0	0	0	0	0

Table 16. Canisters Containing Spent Fuel as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Fuel Canisters Containing					Total Fuel Canisters ^c
				Intact Assemblies	Rods and Pieces ^a	Consolidated Assemblies	Number of Consolidated Assemblies	Unknown Contents ^b	
Indiana Michigan Power Company	Cook 1 & 2	PWR	5801	0	0	0	0	0	0

See footnotes at end of table.

Table 16. Canisters Containing Spent Fuel as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Fuel Canisters Containing					Total Fuel Canisters ^c
				Intact Assemblies	Rods and Pieces ^a	Consolidated Assemblies	Number of Consolidated Assemblies	Unknown Contents ^b	
Kansas Gas and Electric Company	Wolf Creek 1	PWR	2501	0	0	0	0	0	0
Long Island Power Authority	Shoreham	BWR	2601	0	0	0	0	0	0
Louisiana Power and Light Company	Waterford 3	PWR	2701	0	2	0	0	0	2
Maine Yankee Atomic Power Company	Maine Yankee	PWR	2801	0	2	0	0	0	2
Nebraska Public Power District	Cooper Station	BWR	3001	0	0	0	0	0	0
New York Power Authority	FitzPatrick	BWR	3901	0	0	0	0	0	0
	Indian Point 3	PWR	3902	0	0	0	0	0	0
Niagara Mohawk Power Corporation	Nine Mile Point 1	BWR	3101	0	0	0	0	0	0
	Nine Mile Point 2	BWR	3102	0	0	0	0	0	0
North Atlantic Energy Service Corporation	Seabrook	PWR	5901	0	0	0	0	0	0
Northeast Utilities Service Company	Millstone 1	BWR	3201	0	1	0	0	0	1
	Millstone 2	PWR	3202	0	3	3	6	0	6
	Millstone 3	PWR	3203	0	0	0	0	0	0
	Haddam Neck	PWR	5701	0	5	0	0	0	5
Northern States Power Company	Monticello	BWR	3301	0	0	0	0	0	0
	Prairie Island 1 & 2	PWR	3302	0	2	18	36	0	20
Omaha Public Power District	Fort Calhoun	PWR	3401	0	0	0	0	0	0
Pacific Gas and Electric Company	Diablo Canyon 1	PWR	3501	0	0	0	0	0	0
	Diablo Canyon 2	PWR	3502	0	1	0	0	0	1
	Humboldt Bay	BWR	3503	1	0	0	0	0	1

Table 16. Canisters Containing Spent Fuel as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Fuel Canisters Containing					Total Fuel Canisters ^c
				Intact Assemblies	Rods and Pieces ^a	Consolidated Assemblies	Number of Consolidated Assemblies	Unknown Contents ^b	
PECO Energy Company	Limerick 1 & 2	BWR	3701	0	1	0	0	0	1
	Peach Bottom 2	BWR	3704	0	2	0	0	0	2
	Peach Bottom 3	BWR	3705	0	1	0	0	0	1
Pennsylvania Power and Light Company	Susquehanna 1 & 2	BWR	3601	0	1	0	0	0	1
Portland General Electric Company	Trojan	PWR	3801	0	11	0	0	1	12
Public Service Company of Colorado	Fort St. Vrain	HTGR	4101	0	0	0	0	0	0
Public Service Electric and Gas Company	Hope Creek	BWR	4201	0	0	0	0	0	0
	Salem 1	PWR	4202	0	0	0	0	0	0
	Salem 2	PWR	4203	0	0	0	0	0	0
Rochester Gas and Electric Company	Genoa	PWR	4401	0	0	8	11	0	8
Sacramento Municipal Utility District	Rancho Seco	PWR	4501	0	0	0	0	0	0
South Carolina Electric and Gas Company	Summer	PWR	4601	0	0	0	0	0	0
Southern California Edison Company	San Onofre 1	PWR	4701	0	0	0	0	0	0
	San Onofre 2	PWR	4702	0	0	0	0	0	0
	San Onofre 3	PWR	4703	0	0	0	0	0	0
System Energy Resources, Inc.	Grand Gulf 1	BWR	2901	0	1	0	0	0	1
Tennessee Valley Authority	Browns Ferry 1 & 2	BWR	4803	1	0	0	0	0	1
	Browns Ferry 3	BWR	4805	0	0	0	0	0	0
	Sequoyah 1 & 2	PWR	4808	0	0	0	0	0	0
	Watts Bar 1	PWR	4810	0	0	0	0	0	0

See footnotes at end of table.

Table 16. Canisters Containing Spent Fuel as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Fuel Canisters Containing					Total Fuel Canisters ^c
				Intact Assemblies	Rods and Pieces ^a	Consolidated Assemblies	Number of Consolidated Assemblies	Unknown Contents ^b	
Toledo Edison Company	Davis-Besse	PWR	5001	0	1	0	0	0	1
TU Electric	Comanche Peak 1 & 2	PWR	4901	0	0	0	0	0	0
Union Electric Company	Callaway	PWR	5101	0	1	0	0	0	1
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	BWR	6001	0	0	0	0	0	0
Virginia Power	North Anna 1 & 2	PWR	5201	0	1	0	0	0	1
	Surry 1 & 2	PWR	5203	0	2	0	0	0	2
Washington Public Power Supply System	Washington Nuclear 2	BWR	5302	0	0	0	0	0	0
Wisconsin Electric Power Corporation	Point Beach 1 & 2	PWR	5401	12	1	0	0	0	13
Wisconsin Public Service Corporation	Kewaunee	PWR	5501	0	0	0	0	0	0
Yankee Atomic Electric Company	Yankee Rowe	PWR	5601	0	0	0	0	0	0
Total BWR				23	25	0	0	0	48
Total PWR				19	62	31	57	4	116
Total HTGR				0	0	0	0	0	0
Total				42	87	31	57	4	164

^aRods and Pieces column represents the number of canisters containing intact fuel rods from consolidation, reconstitution, or reconstruction.

^bUnknown Contents column represents the number of canisters containing fuel for which the specific contents of the canisters were not reported.

^cTotal includes 145 canisters containing only fuel and 19 canisters containing both fuel and nonfuel items.

PWR=Pressurized-water reactor; BWR=Boiling-water reactor; HTGR=High-temperature, gas-cooled reactor.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 17. Canisters Containing Nonfuel Items as of December 31, 1994

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Nonfuel Canisters Containing					Total Nonfuel Canisters ^e
				Debris ^a	Nonfuel Disassembly Hardware	Nonfuel Components ^b	Other ^c	Unknown Contents ^d	
Alabama Power Company	Farley 1	PWR	0101	0	0	0	0	0	0
	Farley 2	PWR	0102	0	0	0	0	0	0
Arizona Public Service Company	Palo Verde 1	PWR	0301	1	2	4	0	0	6
	Palo Verde 2	PWR	0302	0	4	4	0	0	6
	Palo Verde 3	PWR	0303	0	1	1	0	0	4
Arkansas Power and Light Company	Arkansas Nuclear 1	PWR	0401	0	0	0	0	0	0
	Arkansas Nuclear 2	PWR	0402	0	0	0	0	0	0
Baltimore Gas and Electric Company	Calvert Cliffs 1 & 2	PWR	0501	16	0	0	15	0	21
Boston Edison Company	Pilgrim 1	BWR	0601	0	0	0	0	0	0
Carolina Power and Light Company	Brunswick 1	BWR	0701	0	0	0	0	0	0
	Brunswick 2	BWR	0702	0	0	0	0	0	0
	Harris 1	PWR	0703	0	0	0	1	0	1
	Robinson 2	PWR	0705	0	0	0	2	0	2
Cleveland Electric Illuminating Company	Perry 1	BWR	0901	0	0	0	0	0	0
Commonwealth Edison Company	Braidwood 1 & 2	PWR	1001	0	0	0	3	0	3
	Byron 1 & 2	PWR	1003	0	0	0	0	0	0
	Dresden 1	BWR	1005	0	0	0	0	0	0
	Dresden 2	BWR	1006	0	0	0	0	0	0
	Dresden 3	BWR	1007	0	0	0	0	0	0
	LaSalle County 1 & 2	BWR	1008	0	0	0	0	0	0
	Quad Cities 1 & 2	BWR	1010	0	0	0	0	0	0
	Zion 1 & 2	PWR	1012	0	0	0	2	0	2
Consolidated Edison Company of New York	Indian Point 1	PWR	1101	0	0	0	0	0	0
	Indian Point 2	PWR	1102	0	0	0	0	0	0
Consumers Power Company	Big Rock Point	BWR	1201	0	0	0	0	0	0
	Palisades	PWR	1204	0	0	0	0	0	0

See footnotes at end of table.

Table 17. Canisters Containing Nonfuel Items as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Nonfuel Canisters Containing					Total Nonfuel Canisters ^e
				Debris ^a	Nonfuel Disassembly Hardware	Nonfuel Components ^b	Other ^c	Unknown Contents ^d	
Dairyland Power Cooperative	LaCrosse	BWR	1301	0	0	0	0	0	0
Detroit Edison Company	Enrico Fermi 2	BWR	1402	0	0	4	0	0	4
Duke Power Company	Catawba 1	PWR	1501	0	0	0	0	0	0
	Catawba 2	PWR	1502	0	0	0	0	0	0
	McGuire 1	PWR	1504	1	0	0	0	0	1
	McGuire 2	PWR	1505	0	0	0	0	0	0
	Oconee 1 & 2	PWR	1506	0	0	0	0	0	0
	Oconee 3	PWR	1508	0	0	0	0	0	0
Duquesne Light Company	Beaver Valley 1	PWR	1601	0	1	0	1	0	1
	Beaver Valley 2	PWR	1602	0	0	1	0	0	1
Florida Power Corporation	Crystal River 3	PWR	1701	0	1	1	1	0	1
Florida Power and Light Company	St. Lucie 1	PWR	1801	0	0	0	0	4	4
	St. Lucie 2	PWR	1802	0	0	0	0	1	1
	Turkey Point 3	PWR	1803	0	0	0	0	0	0
	Turkey Point 4	PWR	1804	0	0	0	0	0	0
Georgia Power Company	Hatch 1 & 2	BWR	2001	0	0	0	0	0	0
	Vogtle 1 & 2	PWR	2003	0	0	0	0	0	0
GPU Nuclear Corporation	Three Mile Island 1	PWR	1901	0	0	0	0	0	0
	Oyster Creek	BWR	1903	0	0	0	0	0	0
Gulf States Utilities Company	River Bend 1	BWR	2101	0	0	0	0	0	0
Houston Lighting and Power Company	South Texas 1	PWR	2201	0	0	1	0	0	1
	South Texas 2	PWR	2202	0	0	0	0	0	0
IES Utilities, Inc.	Duane Arnold	BWR	2401	0	0	0	0	0	0
Illinois Power Company	Clinton 1	BWR	2301	0	0	0	0	0	0
Indiana Michigan Power Company	Cook 1 & 2	PWR	5801	0	0	0	0	0	0

See footnotes at end of table.

Table 17. Canisters Containing Nonfuel Items as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Nonfuel Canisters Containing					Total Nonfuel Canisters ^e
				Debris ^a	Nonfuel Disassembly Hardware	Nonfuel Components ^b	Other ^c	Unknown Contents ^d	
Kansas Gas and Electric Company	Wolf Creek 1	PWR	2501	0	0	0	0	0	0
Long Island Power Authority	Shoreham	BWR	2601	0	0	0	0	0	0
Louisiana Power and Light Company	Waterford 3	PWR	2701	2	3	3	1	0	4
Maine Yankee Atomic Power Company	Maine Yankee	PWR	2801	0	0	5	10	0	14
Nebraska Public Power District	Cooper Station	BWR	3001	0	0	0	0	0	0
New York Power Authority	FitzPatrick	BWR	3901	0	0	0	0	0	0
	Indian Point 3	PWR	3902	0	0	0	0	0	0
Niagara Mohawk Power Corporation	Nine Mile Point 1	BWR	3101	0	0	0	0	0	0
	Nine Mile Point 2	BWR	3102	0	0	0	0	0	0
North Atlantic Energy Service Corporation	Seabrook	PWR	5901	0	0	0	0	0	0
Northeast Utilities Service Company	Millstone 1	BWR	3201	0	0	0	0	0	0
	Millstone 2	PWR	3202	0	1	3	0	0	4
	Millstone 3	PWR	3203	0	0	0	0	0	0
	Haddam Neck	PWR	5701	0	0	1	4	0	5
Northern States Power Company	Monticello	BWR	3301	0	0	0	0	0	0
	Prairie Island 1 & 2	PWR	3302	0	0	2	0	0	2
Omaha Public Power District	Fort Calhoun	PWR	3401	0	0	0	0	0	0
Pacific Gas and Electric Company	Diablo Canyon 1	PWR	3501	0	0	0	0	0	0
	Diablo Canyon 2	PWR	3502	0	0	0	0	0	0
	Humboldt Bay	BWR	3503	0	0	0	0	0	0

See footnotes at end of table.

Table 17. Canisters Containing Nonfuel Items as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Nonfuel Canisters Containing					Total Nonfuel Canisters ^e
				Debris ^a	Nonfuel Disassembly Hardware	Nonfuel Components ^b	Other ^c	Unknown Contents ^d	
PECO Energy Company	Limerick 1 & 2	BWR	3701	0	0	1	0	0	1
	Peach Bottom 2	BWR	3704	0	0	2	0	0	2
	Peach Bottom 3	BWR	3705	0	0	0	0	0	0
Pennsylvania Power and Light Company	Susquehanna 1 & 2	BWR	3601	0	0	0	0	0	0
Portland General Electric Company	Trojan	PWR	3801	14	6	20	0	0	21
Public Service Company of Colorado	Fort St. Vrain	HTGR	4101	0	0	0	0	0	0
Public Service Electric and Gas Company	Hope Creek	BWR	4201	0	0	0	0	0	0
	Salem 1	PWR	4202	0	0	0	0	0	0
	Salem 2	PWR	4203	0	0	0	0	0	0
Rochester Gas and Electric Company	Ginna	PWR	4401	0	2	0	0	0	2
Sacramento Municipal Utility District	Rancho Seco	PWR	4501	0	0	0	0	0	0
South Carolina Electric and Gas Company	Summer	PWR	4601	0	0	0	0	0	0
Southern California Edison Company	San Onofre 1	PWR	4701	0	0	0	0	0	0
	San Onofre 2	PWR	4702	0	0	0	0	0	0
	San Onofre 3	PWR	4703	0	0	0	0	0	0
System Energy Resources, Inc.	Grand Gulf 1	BWR	2901	0	0	0	0	0	0
Tennessee Valley Authority	Browns Ferry 1 & 2	BWR	4803	0	0	0	0	0	0
	Browns Ferry 3	BWR	4805	0	0	0	0	0	0
	Sequoyah 1 & 2	PWR	4808	0	0	0	0	0	0
	Watts Bar 1	PWR	4810	0	0	0	0	0	0

See footnotes at end of table.

Table 17. Canisters Containing Nonfuel Items as of December 31, 1994 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Nonfuel Canisters Containing					Total Nonfuel Canisters ^e
				Debris ^a	Nonfuel Disassembly Hardware	Nonfuel Components ^b	Other ^c	Unknown Contents ^d	
Toledo Edison Company	Davis-Besse	PWR	5001	0	2	1	0	0	3
TU Electric	Comanche Peak 1 & 2	PWR	4901	0	0	0	0	0	0
Union Electric Company	Callaway	PWR	5101	0	0	0	0	0	0
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	BWR	6001	0	0	0	0	0	0
Virginia Power	North Anna 1 & 2 Surry 1 & 2	PWR	5201	0	0	1	1	0	2
		PWR	5203	0	0	1	0	0	1
Washington Public Power Supply System	Washington Nuclear 2	BWR	5302	0	0	0	0	0	0
Wisconsin Electric Power Corporation	Point Beach 1 & 2	PWR	5401	0	0	0	0	0	0
Wisconsin Public Service Corporation	Kewaunee	PWR	5501	0	0	0	0	0	0
Yankee Atomic Electric Company	Yankee Rowe	PWR	5601	0	0	0	0	0	0
Total				34	23	56	41	5	120

^aDebris column represents canisters containing fuel rod pieces, fuel pellets, etc.
^bNonfuel Components column represents canisters containing nonfuel assembly hardware.
^cOther column represents canisters containing other nonfuel material.
^dUnknown Contents column represents the number of canisters containing components for which specific data on the contents of the canister were not reported on the Form RW-859 survey.
^eTotal includes 101 canisters containing only nonfuel and 19 canisters containing both fuel and nonfuel items. Total Nonfuel Canisters column may not equal the sum of individual canister contents as they may contain more than one category of nonfuel items.
PWR=Pressurized-water reactor; BWR=Boiling-water reactor; HTGR=High-temperature, gas-cooled reactor.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Nonfuel Components

The term "nonfuel components" may be defined broadly to cover all non-fuel-bearing components which receive radiation during power generation. Generally included are:

- The components used to initiate, control, and monitor the chain reaction in the core, often called NFA hardware (i.e., neutron sources, control elements, burnable absorbers, incore instrumentation)
- The nonfuel portion of a fuel assembly, often called disassembly hardware (i.e., guide tubes, water rods, grids, nozzles)
- Miscellaneous hardware used in the reactor core which is not a part of fuel assemblies (i.e., dummy assemblies, coupon trees).

The standard contract has a more limited definition of non-fuel components which includes most NFA hardware. The contract does not explicitly identify BWR control assemblies located between, rather than within, the SNF assemblies. Nor does it mention disassembly hardware and miscellaneous hardware.

In terms of location of each piece of hardware, a noncanistered nonfuel component can also be distinguished by whether it is integral or nonintegral with an assembly. Nonfuel components may be included as an integral part of the SNF assemblies delivered for disposal. Nonfuel components are generally used within or between assemblies but are not necessarily permanently attached to assemblies. These nonfuel components are usually retired from service on a schedule that is different from that of fuel assemblies.

Because all nonfuel components listed in the standard contract fall into the NFA hardware grouping, NFA hardware has been the focus of the EIA data collection efforts on nonfuel components. Some utilities have reported nonfuel components which are either disassembly hardware or miscellaneous hardware. However, the reporting and analysis which follow deal primarily with NFA hardware.

Nonfuel Components - NFA Categories by Vendor

Nonfuel assembly (NFA) hardware inventories can affect the waste transportation and disposal requirements of the CRWMS. NFA hardware, if attached to a fuel assembly, can represent an increase in total shipment weight, affecting the ability of shipments to meet transportation weight limits. Tables 18, 19, 20, and 21 summarize the responses of the utilities to the Form RW-859 survey section on discharged NFA hardware for the generic reactor assembly classes. These tables do not include other nonfuel components reported by these utilities. The nonfuel components (including NFA hardware) report-

ed by owners of reactor in single-reactor assembly classes (i.e., Dresden 1, Palisades, LaCrosse, etc.) are presented in Table 22. Of the 109 generic assembly class reactors, 8 reactors either did not report nonfuel components data or reported no NFA hardware components. Of the 11 single-reactor assembly class reactors, 3 did not report NFA data. The components of NFA hardware used at various reactors vary significantly with vendors of the Nuclear Steam Supplier System. Each of the first four tables presents the NFA hardware reported for one of the major NSSS vendors (Babcock & Wilcox, Combustion Engineering, General Electric, and Westinghouse).

Storage of Integral NFA Hardware

The Form RW-859 survey also requested the quantities of NFA hardware which are stored in or attached to assemblies and the dimensions of those NFA hardware components. NFA hardware may have been integral to an assembly, noncanistered in baskets, destined for disposal as low-level radioactive waste, or stored in canisters. Approximately 91 percent of the 65,190 pieces of NFA hardware reported were integral to an assembly. Reactor-by-reactor percentages of NFA hardware stored in or attached to assemblies are presented in Tables 18 through 22.

Changes in Fuel Management Strategies

Changes in fuel management strategies have impacted discharge rates of NFA hardware, particularly burnable absorber assemblies. Reactors built by Westinghouse and Babcock & Wilcox use one set of burnable absorber assemblies with the initial reactor fuel. The use of burnable absorber assemblies was resumed in later cycles to control the excess reactivity associated with higher initial fuel enrichments. The effect on quantities of NFA hardware was that reactors built by Westinghouse and Babcock & Wilcox typically began to use significantly larger quantities of NFA hardware each cycle; preliminary results indicate nearly a one-to-one ratio of burnable absorber assemblies with fresh fuel assemblies for both vendors.

Newer features, such as the use of integral fuel burnable absorbers by Westinghouse, are likely to once again reduce quantities of NFA hardware discharged by reactors.

Changeout of Infrequently Replaced Items

Discharged quantities of NFA hardware are often compared to the number of fuel assemblies discharged from the reactor in order to estimate rates of future NFA hardware generation. However, because NFA hardware is not discharged from reactors on the same schedule as fuel, this practice may produce distorted estimates of future NFA hardware discharges,

especially for infrequently replaced items such as control elements.

Control element assemblies are typically irradiated for multiple cycles. For most reactors, control element assemblies are expected to be replaced once or twice during the reactor lifetime and significant numbers are discharged on only two or three occasions. Operators of CE 14 X 14 assembly class reactors report having discharged 609 control element assemblies and 4,551 fuel assemblies. Control element assemblies from CE 14 X 14 reactors represent 13.4 percent of the number of discharged fuel assemblies. Operators of CE 16 X 16 assembly class reactors report having discharged only 3 control element assemblies and 2,340 fuel assemblies. Control element assemblies from CE 16 X 16 reactors represent 0.1 percent of the number of discharged fuel assemblies. The older CE 14 X 14 reactors have completed a changeout of the control element assemblies, where the newer CE 16 X 16 reactors have only discharged defective or damaged control element assemblies. Over the reactor life-time, the number of control element assemblies from CE 16 X 16 reactors is likely to approach the percentage from CE 14 X 14 reactors as the CE 16 X 16 reactors replace fully utilized control element assemblies.

Disposal of NFA Hardware as Low-Level Radioactive Waste

When NFA hardware has reached the end of its useful life, it may exceed the Class C limits for disposal established in 10 CFR 61 for low-level radioactive waste. Hardware which exceeds these limits is referred to as Greater-Than-Class-C waste. NFA hardware which does not exceed these limits may be disposed as a low-level waste. Some utilities have disposed of NFA hardware in this manner, but the EIA does not collect these data on the Form RW-859 survey.

NFA Hardware from Single-Reactor Assembly Classes

The single-reactor assembly class consists of reactors which are not included in the generic assembly class reactors. As of December 31, 1994, there were 4,909 permanently discharged fuel assemblies from the 8 single-reactor assembly class reactors that reported the data (Table 22). Three single-reactor assembly class reactors did not report. There were 1,658 pieces of NFA hardware reported, of which 1,043 (63 percent), were integral to an assembly.

Table 18. Nonfuel Assembly (NFA) Hardware from Babcock & Wilcox Reactors

Reactor Name ^a	Permanently Discharged Fuel Assemblies	NFA Hardware					Total Reported NFA Hardware Items	NFA Hardware Items Reported In/Attached to Fuel Assemblies	NFA Hardware Items In/Attached to Fuel Assemblies (percent)
		Burnable Poison Rod Assemblies	Axial Power Shaping Assemblies	Control Rod Assemblies	Neutron Sources	Orifice Rod Assemblies			
Arkansas Nuclear 1	684	464	16	61	2	68	611	611	100
Crystal River 3	603	280	8	61	2	2	353	0	0
Davis-Besse	518	267	8	20	4	2	301	301	100
Oconee 1 & 2	^b 1,742	^c 992	^c 39	^c 178	^c 4	^c 22	1,235	1,234	100
Oconee 3	808	403	13	4	2	5	427	426	100
Rancho Seco	493	272	^d 16	61	4	62	415	0	0
Three Mile Island 1	578	324	8	61	4	3	400	400	100
Total	5,426	3,002	108	446	22	164	3,742	2,972	79
Ratio to Permanently Discharged Fuel Assemblies (percent)		55.33	1.99	8.22	0.41	3.02			

^aIncludes all Babcock & Wilcox reactors.^bNumber of fuel assemblies in pool represents fuel discharged from two reactors into one pool.^cNumber of nonfuel components in pool represents components discharged from two reactors into one pool.^dIncludes 8 axial power shaping assemblies and 8 gray axial power shaping assemblies.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 19. Nonfuel Assembly (NFA) Hardware from Combustion Engineering Reactors

Reactor Name ^a	Permanently Discharged Fuel Assemblies	NFA Hardware			Total Reported NFA Hardware Items	NFA Hardware Items Reported In/Attached to Fuel Assemblies	NFA Hardware Items In/Attached to Fuel Assemblies (percent)
		Control Element Assemblies	Neutron Sources	Control Element Assembly Flow Plugs			
Arkansas Nuclear 2	636	0	2	0	2	2	100
Calvert Cliffs 1 & 2	^b 1,588	^c 351	^c 4	0	355	355	100
Maine Yankee	1,131	92	1	0	93	93	100
Millstone 2	868	82	4	8	94	91	97
St. Lucie 1	964	84	0	0	84	84	100
San Onofre 2	592	1	0	0	1	1	100
San Onofre 3	592	1	0	0	1	1	100
Waterford 3	520	1	2	0	3	3	100
Total	6,891	612	13	8	633	630	100
Ratio to Permanently Discharged Fuel Assemblies (percent)		8.88	0.19	0.12			

^aIncludes all Combustion Engineering reactors except Palo Verde 1, Palo Verde 2, and Palo Verde 3 which did not report these data.

^bNumber of fuel assemblies in pool represents fuel discharged from two reactors into separate pools joined by a transfer canal.

^cNumber of nonfuel components in pool represents components discharged from two reactors into separate pools joined by a transfer canal.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 20. Nonfuel Assembly (NFA) Hardware from General Electric Reactors

Reactor Name ^a	Permanently Discharged Fuel Assemblies	NFA Hardware					Total Reported NFA Hardware Items	NFA Hardware Items Reported In/Attached to Fuel Assemblies	NFA Hardware Items In/Attached to Fuel Assemblies (percent)
		Fuel Channels	Control Blades	Neutron Sources	Local Power Range Monitors	Other Instrumentation			
Browns Ferry 1	1,580	1,555	0	0	0	0	1,555	1,555	100
Browns Ferry 2	1,900	1,849	0	0	0	1	1,850	1,849	100
Browns Ferry 3	1,030	1,004	0	0	0	0	1,004	1,004	100
Brunswick 1	1,339	11	25	0	0	0	36	0	0
Brunswick 2	1,552	835	0	0	0	34	869	829	95
Clinton 1	724	724	0	5	17	11	757	724	96
Cooper Station	1,860	4	4	0	3	25	36	0	0
Dresden 2	2,813	23	6	0	44	23	96	0	0
Dresden 3	2,044	70	7	0	16	1	94	0	0
Enrico Fermi 2	860	860	0	0	29	0	889	860	97
FitzPatrick	1,888	0	51	0	15	0	66	0	0
Grand Gulf 1	1,660	1,660	0	7	71	18	1,756	1,660	95
Hatch 1 & 2	^b 3,919	^c 3,928	0	0	0	0	3,928	3,928	100
Hope Creek	1,240	1,240	27	1	15	0	1,283	1,240	97
LaSalle County 1 & 2	2,360	2,536	24	15	15	4	2,594	2,536	98
Limerick 1 & 2	^b 1,988	^c 2,593	^c 8	^c 3	0	0	2,604	2,493	96
Millstone 1	2,304	1,800	0	0	0	0	1,800	1,800	100
Monticello	1,880	737	47	11	12	0	807	732	91
Nine Mile Point 1	1,812	1,620	1	0	2	0	1,623	0	0
Nine Mile Point 2	640	444	0	4	0	0	448	0	0
Oyster Creek	2,048	1,729	32	11	48	0	1,820	1,729	95
Peach Bottom 2	2,436	2,436	1	0	10	0	2,447	2,436	100
Peach Bottom 3	2,200	2,200	41	1	0	0	2,242	2,200	98
Perry 1	972	744	37	11	50	0	842	743	88
Pilgrim 1	1,628	1,629	55	1	112	44	1,841	1,654	90
Quad Cities 1 & 2	4,284	370	16	0	19	22	427	369	86
River Bend 1	956	956	53	10	41	0	1,060	956	90
Susquehanna 1 & 2	^b 3,112	^c 3,112	^c 54	0	^c 38	0	3,204	3,112	97
Vermont Yankee	1,978	1,494	3	0	3	0	1,500	1,494	100
Washington Nuclear 2	1,196	980	24	11	8	0	1,023	925	90
Total	56,203	39,143	516	91	568	183	40,501	36,828	91
Ratio to Permanently Discharged Fuel Assemblies (percent)									
		69.65	0.92	0.16	1.01	0.33			

^aIncludes all General Electric reactors except Duane Arnold and Shoreham which did not report these data.

^bNumber of fuel assemblies in pool represents fuel discharged from two reactors into separate pools joined by a transfer canal.

^cNumber of nonfuel components in pool represents components discharged from two reactors into separate pools joined by a transfer canal.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 21. Nonfuel Assembly (NFA) Hardware from Westinghouse Reactors

Reactor Name ^a	Permanently Discharged Fuel Assemblies	NFA Hardware					Total Reported NFA Hardware Items	NFA Hardware Items Reported In/Attached to Fuel Assemblies	NFA Hardware Items In/Attached to Fuel Assemblies (percent)
		Burnable Poison Rod Assemblies	Thimble Plug Assemblies	Rod Cluster Control Assemblies	Neutron Sources	Incore Instrumentation			
Beaver Valley 1	563	223	103	5	4	0	335	334	100
Beaver Valley 2	260	66	^b 140	0	4	0	210	194	92
Braidwood 1 & 2	^c 668	^d 444	^d 32	^d 113	^d 4	^d 3	596	378	63
Byron 1 & 2	^e 864	^e 572	^d 57	^d 108	^d 6	0	743	548	74
Callaway	546	230	28	55	2	0	315	259	82
Catawba 1	484	382	35	8	2	0	427	399	93
Catawba 2	444	350	40	5	2	0	397	363	91
Comanche Peak 1 & 2	^e 293	^f 258	^f 49	0	^f 4	^f 7	318	288	91
Cook 1 & 2	^c 1,679	^e 860	^d 255	^d 30	^d 12	0	1,157	1,157	100
Diablo Canyon 1	464	184	94	0	4	12	294	276	94
Diablo Canyon 2	484	132	134	0	4	6	276	263	95
Farley 1	716	431	177	5	6	25	644	615	95
Farley 2	558	386	106	0	6	25	523	496	95
Ginna	761	47	178	36	10	0	271	270	100
Harris 1	276	115	0	53	13	5	186	181	97
Indian Point 2	748	458	219	2	10	0	689	697	101
Indian Point 3	582	0	1	0	0	0	1	0	0
Kewaunee	684	274	102	68	5	72	521	449	86
McGuire 1	616	543	49	11	2	0	605	573	95
McGuire 2	628	670	66	15	1	0	752	746	99
Millstone 3	332	109	2	65	2	1	179	175	98
North Anna 1 & 2	^c 1,170	^d 1,020	^d 152	^d 6	^d 12	0	1,190	1,037	87
Point Beach 1 & 2	^c 1,315	^d 362	^d 323	^d 69	^d 14	0	768	762	99
Robinson 2	824	4	2	6	5	33	50	15	30
Salem 1	685	495	134	10	6	0	645	645	100
Salem 2	522	300	94	0	4	0	398	398	100
Seabrook	208	90	3	0	2	0	95	63	66
Sequoyah 1 & 2	^c 901	^d 495	^d 87	^d 12	^d 9	0	603	603	100
South Texas 1	229	189	49	57	2	0	297	220	74
South Texas 2	188	166	1	57	2	0	226	149	66
Summer	504	222	76	48	4	0	350	324	93
Surry 1 & 2	^c 1,391	^e 520	^d 66	^d 109	^d 7	0	702	702	100
Trojan	780	92	140	61	6	0	299	299	100

See footnotes at end of table.

Table 21. Nonfuel Assembly (NFA) Hardware from Westinghouse Reactors (Continued)

Reactor Name ^a	Permanently Discharged Fuel Assemblies	NFA Hardware					Total Reported NFA Hardware Items	NFA Hardware Items Reported In/Attached to Fuel Assemblies	NFA Hardware Items In/Attached to Fuel Assemblies (percent)
		Burnable Poison Rod Assemblies	Thimble Plug Assemblies	Rod Cluster Control Assemblies	Neutron Sources	Incore Instrumentation			
Turkey Point 3	657	274	191	10	2	0	477	476	100
Turkey Point 4	651	296	115	9	2	0	422	422	100
Vogtle 1 & 2	^e 646	^f 430	^f 1	^f 106	^f 2	^f 26	565	539	95
Wolf Creek	488	322	83	108	2	14	529	336	64
Zion 1 & 2	^c 1,684	^d 894	^d 548	^d 143	^d 8	^d 8	1,601	1,593	100
Total	25,493	12,905	3,932	1,390	192	237	18,656	17,244	92
Ratio to Permanently Discharged Fuel Assemblies (percent)		50.62	15.42	5.45	0.75	0.93			

^aIncludes all Westinghouse reactors except Prairie Island 1 & 2 and Watts Bar 1 which did not report these data.

^bQuantity includes 32 water displacement assemblies.

^cNumber of fuel assemblies in pool represents fuel discharged from two reactors into one pool.

^dNumber of nonfuel components in pool represents components discharged from two reactors into one pool.

^eNumber of fuel assemblies in pool represents fuel discharged from two reactors into separate pools joined by a transfer canal.

^fNumber of nonfuel components in pool represents components discharged from two reactors into separate pools joined by a transfer canal.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 22. Nonfuel Assembly (NFA) Hardware from Single-Reactor Assembly Class Reactors

Reactor Name ^a	Permanently Discharged Fuel Assemblies	NFA Hardware						Total Reported NFA Hardware Items	NFA Hardware Items Reported In/Attached to Fuel Assemblies	NFA Hardware Items In/Attached to Fuel Assemblies (percent)
		Burnable Absorbers	Plug Assemblies	Control Assemblies ^b	Neutron Sources	Incore Instrumentation	Fuel Channels			
Big Rock Point	401	0	0	52	8	41	128	229	2	1
Dresden 1	892	0	0	0	0	0	534	534	534	100
Haddam Neck	892	0	2	50	12	19	0	83	63	76
Humboldt Bay	390	0	0	0	2	0	389	391	389	99
LaCrosse	333	0	0	39	2	0	177	218	0	0
Palisades	792	0	16	1	6	129	0	152	6	4
St. Lucie 2	544	0	0	39	2	0	0	41	41	100
San Onofre 1	665	0	8	2	0	0	0	10	8	80
Total	4,909	0	26	183	32	189	1,228	1,658	1,043	63
Ratio to Permanently Discharged Fuel Assemblies (percent)		0.00	0.53	3.73	0.65	3.85	25.02			

^aIncludes all single-reactor assembly class reactors except Fort Calhoun, Indian Point 1, and Yankee Rowe which did not report these data.

^bIncludes control rod blades and control rod assemblies.

^cNumber of permanently discharged fuel assemblies do not include assemblies that have been reprocessed. (See Technical Note 6 in Appendix E..)

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

4. Assembly Characteristics

Background

A light-water reactor (LWR) fuel assembly (or bundle) is a configuration of fuel rods assembled together for insertion into a reactor core. Each fuel rod consists essentially of a stack of uranium dioxide (UO₂) pellets encapsulated within a metal tube that is sealed at both ends. Current LWR's use zircaloy cladding almost exclusively because of its lower neutron absorption relative to stainless steel.

Generally, the assembly configurations are square arrays of many different sizes. For example, one boiling-water reactor (BWR) design uses an array of 6 rods by 6 rods. BWR designs have had 6x6, 7x7, 8x8, 9x9, 10x10, and 11x11 fuel rod arrays. Pressurized-water reactor (PWR) designs have 13x14, 14x14, 15x15, 15x16, 16x16, 17x17, and 17x18 fuel rod arrays. Virtually all assemblies are stamped with a unique identifier.

The Energy Information Administration (EIA) uses a categorization of assembly classes and assembly types within each class for spent fuel. This categorization, described in Appendix B, is based on the rod array configuration, fuel vendor, and other distinguishing characteristics, such as assembly length and width and type of fuel cladding. The eight-character assembly type codes listed in Appendix B are the codes used on Form RW-859. Neither enrichment nor discharge burnup affects the assembly type classification.

Some assembly types have had very limited use. For example, the Big Rock Point reactor has used 84-inch-long assemblies loaded with fuel rods in 7x7, 8x8, 9x9, and 11x11 array configurations. These assemblies had a range of initial loading weights of uranium and were fabricated by either General Electric, Nuclear Fuel Services, or Siemens Nuclear Fuel Company (formerly Advanced Nuclear Fuel Corporation, Exxon Nuclear Corporation, and Jersey Nuclear). These assemblies were manufactured exclusively for the Big Rock Point reactor.

Appendix B provides an excerpt from Form RW-859 instructions, titled "Descriptions of Assembly Types" (Table B4). This table defines the assembly type codes used in this report, and was the basis for developing Tables 23 and 24 for discharged assemblies. Assembly types are listed by reactor type (BWR, PWR) and are

then further identified by fabricator, cladding material, initial uranium content, size, and number discharged (Appendix B, Table B5). There are 134 different reactor fuel assembly types which have been fabricated for nuclear power reactors (Table B5). BWR fuel assemblies range from 4.28 to 6.52 inches in width, 84.0 to 176.2 inches in length, and have a uranium content of 70 to 195 kilograms (kg) (Table B5). PWR fuel assemblies range from 6.14 to 8.54 inches in width, from 111.8 to 199.0 inches in length, and have a uranium content of 152 to 542 kg (Table B5). Assembly type summaries by reactor unit and by assembly type are also presented in Appendix B, Table B6 and Table B7, respectively.

The Characteristics Data Base (CDB) contains a more complete physical description of each type of assembly. The CDB includes the characteristics of the fuel pellets in each assembly, the material composition of each component of the hardware, and related information. It also contains detailed mechanical drawings for some assembly types.

Assembly Distribution

There are six fabricators that have produced BWR assemblies: Allis Chalmers, GE Nuclear Energy, Nuclear Fuel Services, Siemens Nuclear Fuel Company, United Nuclear Corporation, and Westinghouse Electric. PWR assemblies have been produced by seven fabricators: ABB Combustion Engineering, Babcock & Wilcox Company, General Atomics, Nuclear Materials and Equipment Corporation, Siemens Nuclear Fuel Company, United Nuclear Corporation, and Westinghouse Electric. Of these assembly fabricators, approximately 90 percent of BWR assemblies were produced by GE Nuclear Energy, and 58 percent of PWR assemblies were produced by Westinghouse Electric (Table 23).

The distribution of assembly transverse dimensions (Table 24) vary from 84.0 to 176.2 inches long for BWR assemblies. However, 97 percent of all these assemblies are greater than or equal to 171.2 inches in length. Assembly lengths used in PWR's range from 111.8 to 199.0 inches; 80 percent of all PWR assemblies are greater than or equal to 159.8 inches in length. Assemblies used in BWR's vary in maximum "as built" assembly width from 4.28 to 6.52 inches. Maximum as

built assembly widths used in PWR's are from 6.27 to 8.54 inches. More than 98 percent of the BWR assemblies are greater than or equal to 5.44 inches in width, and approximately 62 percent of PWR assemblies are greater than or equal to 8.44 inches in width.

Assembly Identifiers

Domestic LWR fuel assemblies are identified by a serial number that is stamped on each assembly. These serial numbers serve as identifiers throughout the life of the fuel. The uniqueness of assembly serial numbers is important in determining their effectiveness as unambiguous identifiers. The Oak Ridge National Laboratory report, *Analysis of Assembly Serial Number Usage in Domestic Light-Water Reactors* (ORNL/TM11841, May 1991), studied serial numbering schemes, the effectiveness of these schemes, and how many duplicate serial numbers occur on domestic LWR fuel assemblies. The serial numbering scheme adopted by the American National Standards Institute (ANSI) ensures unique-ness of assembly serial

numbers. Westinghouse, Babcock & Wilcox, and Siemens use the ANSI Standard for serial numbers. Combustion Engineering and General Electric both use serial numbers which are unique but do not follow the ANSI Standard. Some assemblies fabricated prior to the establishment of the ANSI Standard in 1978 (ANSI/ANS 57.8 - 1978, reaffirmed in 1987) may have their own serial number schemes which are unique only at the reactor where they were originally irradiated.

Most of the numbering schemes used by electric utilities are not inherently unique, and errors within such schemes account for all of the identified serial number duplication except for six isolated instances. During an analysis of individual fuel inventories, three duplicate serial numbers were found that could be traced back to data response errors. There were also three instances where the serial numbers of assemblies used for hot cell studies differed from the serial numbers reported to EIA. As a result of these instances, EIA requests that utilities provide the stamped serial number on the assembly when reporting these data on the Form RW-859 survey.

Table 23. Discharged Assemblies by Fuel Fabricating Company and Reactor Type

Fabricating Company	Total Assemblies	Fabricating Company (percent)
BWR Assemblies		
Allis Chalmers	155	0.26
GE Nuclear Energy	54,126	89.99
Nuclear Fuel Services	8	0.01
Siemens Nuclear Fuel Company	5,393	8.97
United Nuclear Corporation	458	0.76
Westinghouse Electric	4	0.01
BWR Subtotal	60,144	100.00
PWR Assemblies		
ABB Combustion Engineering	8,191	18.37
Babcock & Wilcox Company	6,143	13.77
General Atomics	3	0.01
Nuclear Materials and Equipment Corporation	4	0.01
Siemens Nuclear Fuel Company	4,023	9.02
United Nuclear Corporation	73	0.16
Westinghouse Electric	26,074	58.46
Undetermined ^a	87	0.20
PWR Subtotal	44,598	100.00
Total	104,742	100.00

^aA total of 87 PWR temporarily discharged assemblies do not have an assigned assembly type code. Without an assembly type code, the fuel fabricating company cannot be identified. See Technical Note 10 in Appendix E.

BWR = Boiling-water reactor; PWR = Pressurized-water reactor.

Note: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 24.2 metric tons of uranium (MTU), were discharged. These HTGR fuel elements are *not* included in the above table. See Technical Note 5 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table 24. Distribution of Discharged Assembly Transverse Dimensions

Assembly Length (inches)	Assembly Width (inches)	Number of Assemblies	Assembly (percent)
Boiling-Water Reactors (BWR)			
84.0	6.52	421	0.70
95.0	4.67	390	0.65
102.5	5.62	333	0.55
134.4	4.28	892	1.48
171.2	5.44	18,625	30.97
172.0	5.44	188	0.31
176.2	5.44	39,295	65.34
Total		60,144	100.00
Pressurized-Water Reactors (PWR)			
111.8	7.62	533	1.20
137.1	7.76	665	1.49
137.1	8.42	892	2.00
138.8	6.27	160	0.36
146.0	8.10	570	1.28
147.5	8.20	793	1.78
157.0	8.10	4,565	10.24
158.2	8.10	544	1.22
159.8	7.76	4,093	9.18
159.8	8.44	22,364	50.15
165.7	8.54	5,439	12.20
176.8	8.10	2,340	5.25
178.3	8.10	1,132	2.54
199.0	8.43	421	0.94
Total		^a44,598	^a100.00

^aA total of 87 temporarily discharged PWR assemblies that have not been assigned an assembly type code are included in the column total. See Technical Note 10 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Survey Methodology

Survey Design

The Energy Information Administration (EIA) administers the Nuclear Fuel Data survey, Form RW-859, under a Memorandum of Understanding with the Office of Civilian Radioactive Waste Management (OCRWM). Form RW-859 is used to collect data from all commercial utilities that operate nuclear power plants and from all other owners of commercial spent nuclear fuel. Form RW-859 is a mandatory data collection form authorized under the Federal Energy Administration Act of 1974, as amended (15 USC 761 et seq.) and the Nuclear Waste Policy Act of 1982, as amended (42 USC 10101 et seq.).

Respondents to the Nuclear Fuel Data survey are required to report data on every fuel assembly discharged from domestic commercial nuclear reactors, spent fuel projected to be discharged, and spent fuel storage pool inventories and capacities. Form RW-859 respondents report all assemblies discharged at the end of the reporting cycle, assemblies to be inserted during the next cycle, previously irradiated assemblies to be inserted in the next cycle, and assemblies shipped to dry storage or to another storage site. A copy of the 1994 Form RW-859 is included in this appendix.

For all assemblies discharged during the most recent refueling interval, the utilities submit the following data on Form RW-859:

- Discharge cycle
- End-of-cycle date
- Average initial loading weight for each batch of assemblies, in kilograms of uranium (kg)
- Average nominal initial enrichment assay for each batch of assemblies, in percent weight
- Average discharge burnup for each batch of assemblies, in gigawattdays thermal per metric ton of uranium (GWDt/MTU)
- Assembly type (Table B4) configuration and rod array for each batch of assemblies
- Current storage location of each assembly
- Standard disposal contract number applicable to each assembly
- Number of assemblies in each batch.

The above spent fuel discharge data are reported at the batch level. A batch is characterized by the number of assemblies in it, the nominal initial fuel enrichment, and the batch average discharge burnup. The utilities also provide spent fuel discharge projections for their next five fueling cycles, along with the projected cycle shut down dates and the cycle burnup in terms of effective full-power days. Spent fuel storage data include: the amount of fuel stored at each pool site or in dry storage; current, licensed and maximum storage site capacities; data on planned increases in pool storage capacity; maximum cask weights that can be handled at each site; and, scheduled shipments of assemblies to other locations.

Survey Universe and Frame

Form RW-859 is a total universe survey of all owners of commercial spent nuclear fuel. The Form RW-859 survey frame consists of all commercial electric utility nuclear power plants and four privately-owned storage facilities possessing irradiated nuclear fuel from commercial power plants. (Data on commercial fuel stored at other storage facilities are reported by the utilities from which the fuel originated.)

The respondent population for Form RW-859 is stable. The frame contains operating reactors, storage facilities, reactors that have been permanently shut down, and reactors that have been constructed but are not yet operating. Shut down reactors are maintained on the survey frame for their historical data. Currently, 54 utilities report for 119 reactors. Four storage facilities are also required to report.

Data Collection Procedures

EIA sends survey packages in December to an official of each company, via certified mail to ensure receipt and to ascertain the correct mailing address. Survey packages include a diskette containing current data, a software diskette, a paper copy of the survey form, a set of instructions, a pictogram showing current inventory and storage data, a cover letter, and a return envelope. All Form RW-859 respondents submit their data on diskette.

The microcomputer software system used to collect Form RW-859 data is referred to as the Automated Nuclear Fuel Data Collection System (ANFDCS). This is a Clipper-compiled program with a dBASE file structure. The microcomputer software is designed to run on any IBM-compatible microcomputer.

To reduce respondent burden, EIA provides the utilities with their current data and requests updated data using the ANFDCS and the instructions provided. EIA provides assistance in completing the survey by telephone when requested. Most respondents successfully and accurately update data diskettes with little or no assistance and file their completed surveys by the requested deadlines.

Data Editing, Analysis, and Processing

As EIA receives survey packages from Form RW-859 respondents, they are logged in and reviewed. A preliminary review is conducted to check for obvious errors or omissions and to verify respondent name, address, and contact information. Data from the completed Form RW-859 surveys are then uploaded to the EIA mainframe computer and maintained in two files. The first is an assembly-level SAS file, which contains data on all individual assemblies at all reactors. These detailed assembly data are aggregated to the batch level. Batch level data are maintained in the second file, a partitioned data set of flat transaction files, with one member for each reactor.

Computer programs are utilized to review individual assembly data and report the data in organized formats that are useful to both analysts and management. A number of the tables and graphs presented in this report were produced from these programs. These tables are also available through the Nuclear Data Information System (NUCDIS), a microcomputer-based, menu-driven information retrieval system. Additional tables, which may be of interest to analysts requiring greater detail, are available upon request from OCRWM or EIA.

In addition to updating the historical Form RW-859 data files, EIA also produces spent fuel projections, using a set of assumptions concerning the future operation of the Nation's nuclear power plants. While the projected data submitted by the utilities generally forecast a more optimistic operating environment, in aggregate, than has actually been achieved, both EIA and utility forecasts track each other reasonably well in the short term. EIA developed the Disaggregate Forecasting System to bring the aggregated EIA forecasts in line with comparable utility projections. This process preserves, as much as possible, the

information that the reactor operators provide in their spent fuel projections. The disaggregated forecasts are published annually in EIA's *World Nuclear Outlook* report.

The historical data submitted on Form RW-859, aggregated to the batch-level, along with the projections of spent fuel discharges from EIA's disaggregated forecasts, constitute the official DOE spent fuel data base. EIA distributes this data base in computer files on magnetic tape to OCRWM and its contractors, and to the DOE national laboratories for their review and analysis.

Response Rates

Respondents to Form RW-859 are required to submit forms under one of two options, chosen by the utility. Option A requires a utility to submit its data within 90 days of cycle startup after refueling. Data reflect the utility's status at cycle startup. Option B requires a utility to submit data once each year by February 15. Data reflect the utility's status as of December 31 of the previous year. Storage-only facilities are required to report annually by February 15 for the previous year.

A total of 19 Option A reactors submitted data reflecting a cycle startup after refueling in 1994. Data for the remaining 27 Option A reactors were simply "rolled over" from the previous year. All 73 Option B reactors and 4 storage facilities also reported. The data presented in this report, therefore, represent an accurate account as of December 31, 1994.

Missing Data and Imputation

EIA encourages utilities to complete all elements on Form RW-859. If there are omissions, or if incorrect or inconsistent data are reported, the EIA Survey Manager telephones the utility to obtain missing or corrected data.

A limited number of data items were identified as missing or omitted from Form RW-859 data files. Most missing items represented data not available to the utilities in their data files. Respondents were telephoned regarding the missing items to verify that these items could not be reported. Only confirmed company-reported data are contained in the data base and included in this report.

Historically, there was no imputation of data into the Form RW-859 data base. For the 1994 survey year, assembly weights for 98 temporarily discharged assemblies with missing weights were calculated,

based on the average weight for assemblies with similar characteristics, and entered into the data base. See Technical Note 10 in Appendix E for additional information regarding these and other data items which were identified as missing or omitted from Form RW-859 data files.

EIA Quality Assurance Procedures

To ensure the quality and accuracy of data collected on Form RW-859, EIA has developed extensive quality assurance (QA) procedures as part of the Form RW-859 survey processing system. At the core of the process is a QA program that produces a matrix for each reactor identifying possible errors throughout the processing cycle. The program ensures that data submitted on diskettes have been correctly uploaded from the PC to the mainframe. After the Survey Manager and other data users have reviewed the EIA QA matrix for a particular reactor, data are corrected and an iterative process of running additional reports is performed until all data for that reactor are clean. A description of the EIA QA reports and a more detailed discussion of EIA QA procedures are included in Appendix D of this report.

The accuracy of spent fuel assembly weights and discharge dates has been verified through reconciliation with two separate but related efforts: the spent fuel fee paid by utilities for assemblies discharged prior to April 7, 1983; and, the acceptance priority ranking process which designates the order in which spent fuel will be picked up by DOE on an oldest-fuel-first basis.

Changes to Survey Form

OCRWM is currently undertaking an extensive effort to consolidate the range of data sources and data bases into a single unified system. This Unified DataBase (UDB) system is being designed to integrate information throughout the Civilian Radioactive Waste Management System, to eliminate duplication of data and effort within OCRWM, and to expand the current information base available to data users. The collection vehicle for commercial nuclear fuel data in the UDB will be the annual Form RW-859, Nuclear Fuel Data survey, and the new five-year Form RW-859S, Nuclear Fuel Data Supplemental survey.

To reduce the reporting burden of the Form RW-859, EIA has reduced the content of the Form RW-859 to collect only those data elements that require annual update. Data that are not subject to annual revision will now be collected every five years on the Supplemental Form RW-859S survey form.

The following items will no longer be collected annually on the Form RW-859 survey, but will be collected once every five years on the Supplemental Form RW-859S:

- Dates not subject to annual revision (license renewal, reactor retirement, etc.)
- Cask-handling data
- Specific data on canisters and their contents
- Nonfuel components.

The following items have been added to the annual Form RW-859:

- Question on quality assurance procedures and traceability
- Assembly-specific information on initial uranium content, initial enrichment, and burnup
- Current cycle start date

The following items will now be collected on the five-year Supplemental Form RW-859S:

- Reactor information including type, nuclear steam system supplier, design type, operation status, location, and rating
- Pool site configuration
- Crane data including capacity, limiting factors, dimensions, and clearances
- Site-specific access and configuration data for the receiving\upending area, cask handling, pool cask loading area, and set-down platform area
- Historical assembly-specific data not previously reported.

The following items will no longer be collected on either the annual Form RW-859 or five-year Supplemental Form RW-859S:

- Capacity data other than license capacity and current usable capacity
- Temporarily discharged fuel (all discharged fuel will be now designated as permanently discharged) and changes in assembly status
- Cross-referenced assembly identifiers including American National Standard Institute (ANSI) identifier and fuel fabricator assembly identifiers
- Data on reconstituted fuel.

A Federal Register Notice was published on August 2, 1995, with a 60-day comment period. As no comments were received, the survey package was forwarded to the Office of Management and Budget (OMB) on October 3, 1995. Upon approval by OMB, the annual Form RW-859 and five-year Supplemental Form RW-859S will be used for the 1995 survey year.

REACTOR CODE [] REACTOR NAME []

RW-859 U.S. DEPARTMENT OF ENERGY Form Approved:
Washington, D.C. 20585 OMB No.: 1901-0287
Expires: 12/31/97

1994 NUCLEAR FUEL DATA FORM

Data on this mandatory form are collected under authority of the Federal Energy Administration Act of 1974 (15 USC Section 761 et seq.), and the Nuclear Waste Policy Act of 1982 (42 USC 10101 et seq.). This form should be completed by all owners and custodians of commercial nuclear power plants that are in operation and by all other owners of spent nuclear fuel. This form should also be completed by all those who have possession of spent nuclear fuel from commercial nuclear power plants.

The public reporting burden for this collection of information is estimated to average 60 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspects of this collection of information, including suggestions for reducing this burden, to the Energy Information Administration, Office of Statistical Standards, EI-73, M. S. 2F-081 Forrestal, 1000 Independence Avenue, S.W., Washington, DC 20585, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

This form shall be submitted (a) 90 days after a cycle startup with data reflecting the status at cycle startup; however, for the 1994 survey year respondents will have until February 15, 1995 to report instead of their normal due date or (b) by February 15, 1995 with data that reflects the status as of December 31 of the preceding year. A respondent may choose either reporting option, but once chosen, any change in the reporting schedule would require DOE concurrence. Respondents choosing option "a," who have a reactor in an extended shutdown status, would be required to submit the form only if the shutdown extends to 365 days, and thereafter, only if a fuel status change occurs (e.g., discharging fuel from the core, transporting fuel to another location). Only one form need be submitted if the fuel status change occurs in preparation for an impending startup, i.e., when the regular schedule is resumed. Operators of storage-only facilities which do not irradiate fuel shall complete this form by February 15, 1995.

Failure to file after receiving Energy Information Administration (EIA) notification may result in criminal fines, civil penalties and other sanctions as provided by the law. Data being collected on this form are not considered to be confidential.

As described in Article VIII of the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste, you also have a contractual obligation to report any changes in the status of fuel assemblies covered by the one-time fee to the DOE on Annex B of Appendix G of the Standard Contract.

Please refer all questions to: Mr. Howard Chou at (202) 254-5567 and return completed form to:

Energy Information Administration (EI-523)
U.S. Department of Energy
Attn: RW-859 Mail Stop BG-094
Washington, D.C. 20585

NUCLEAR FUEL DATA FORM

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Appendix A - Instructions for Completing the Nuclear Fuel Data Form
Appendix B - Glossary of Terms
Appendix C - Software Instructions

Section I. Administrative Data

1. Utility Name :
Mailing Address:

Name of Reactor:

2. Person who may be contacted to verify information provided on this form

Name:
Title:
Mailing Address:

Telephone Number:

3. Authorized Signature/Certification: I certify as a cognizant individual that the historical information contained herein and in any associated electronic media supplied and other materials appended hereto are true and accurate to the best of my knowledge. (NOTE: Corporate officer signature is not required, but the signator must be appropriately authorized.)

Name:
Title:
Mailing Address:

Signature: _____

Date: _____

Title 18 USC 1001 makes it a crime for any person to knowingly and willfully make any false, fictitious, or fraudulent statements to any department or agency of the United States Government as to any matter within its jurisdiction.

Section II. Technical Data

A. Reactor Data

1. Site Data

1.1 Reactor Operating License Expiration Date: [] (CCYYMM)

2. Cycle Data

2.1 Cycle number for this report: []
Cycle start up date: [] (CCYYMMDD)

2.2 Does the code used at your site calculate burnups which are rod-specific, assembly-specific, or batch-specific?
____Rod-specific ____Assembly-specific ____Batch-specific
(check one)

2.3 Does the code account for the varying enrichment?
____Yes ____No

3. Planning Data

3.1 Projected Reactor Retirement Date: [] (CCYYMM)

3.2 Have you applied for a renewal of your operating license to extend to 40 years?
____Yes ____No

If yes, to what date did your company apply to renew your operating license? [] (CCYYMM)

3.3 Based on your company's most recent study on reactor license renewal and assuming the Nuclear Regulatory Commission (NRC) rule associated with reactor license renewal beyond 40 years is finalized, does your company consider license renewal feasible for this reactor?
____Yes ____No ____Undecided

If yes, to what date would your company try to renew your operating license? [] (CCYYMM)

B. Storage Data

Complete Sections B.1, B.2 and B.3 for each storage site, including storage pools and dry storage facilities.

1. Site Data

1.1 Storage Site (Wet and Dry)

a. Contributing Reactors _____
(Combine utility and reactor ID numbers) _____

Inventory

b. No. of assemblies from _____
Contributing Reactors _____

c. What is the current fuel inventory at the storage site, excluding those stored in canisters?

Wet Storage:

No. of Assemblies: [BWR] _____ [PWR] _____
MTU : [BWR] _____ [PWR] _____

Dry Storage:

No. of Assemblies: [BWR] _____ [PWR] _____
MTU : [BWR] _____ [PWR] _____

1.2 a. What is the maximum cask-weight that can presently be received and handled at this storage site (keeping in mind receiving bay floor loading, rail spur or road bed limits, crane capabilities, etc.) [] tons.

b. What is the limiting factor?

c. Have you conducted studies to determine if the maximum cask-weight that may be handled can be increased?
____Yes ____No.

d. If Yes to 1.2.c, is it feasible to increase the maximum cask-weight that may be handled? ____Yes ____No

e. If Yes to 1.2.d, what was the estimated maximum cask-weight? [] tons.

2. Storage Site Capacity

2.1 Compute the correct maximum established site capacity in the storage pool:

	BWR	PWR
a. Current licensed capacity (slots)*	_____	_____
b. Current capacity (accessible slots)	_____	_____
c. Number of slots that will never be used for spent nuclear fuel	_____	_____
d. Number of net additional slots scheduled to increase site capacity		
(1). Reracking	_____	_____
(2). Rod consolidation	_____	_____
(3). Other	_____	_____
(4). Total	_____	_____

Use Item d(4) in Item f calculation.

e. Other adjustments (please explain in III.A.)	_____	_____
f. Total Maximum Established Site Capacity (Sum Item b - Item c + Item d(4) - Item e)	_____	_____

g. Number of slots reserved for operational flexibility (e.g., full core reserve)	_____	_____
---	-------	-------

* A slot holds the equivalent of one nuclear fuel assembly in a matrix within a spent fuel storage rack.

Please avoid double-counting of slots and under-reporting of slots.

2.2 Report the current site capacity for dry storage

	BWR	PWR
a. Current licensed capacity (slots) *	_____	_____
b. Current capacity (slots)	_____	_____

2.3 Considering 2.1.f and 2.2.a, what is the estimated date on which you would not continue reactor operation, because of a lack of storage space for discharged fuel absent spent fuel pickup by DOE?
[] (CCYYMM)

3. Planning Data

3.1 Storage Plans (Wet and Dry)

a. Does your company have plans to increase the storage capacity at this site by any one of the following methods: reracking, rod consolidation, dry storage, transshipment or other?
Yes _____ No _____ Undecided _____

b. Does your company have contractual agreements for dry storage? Yes _____ No _____

If yes, describe the module:

Manufacturer: _____

Number of modules: _____

Assemblies per module: _____

Sealed: Yes _____ No _____

Date of planned installation: (CCYYMM) _____

Vertical: _____ or Horizontal: _____

Concrete: _____ or steel: _____

3.2 What is the number of assemblies that your company has scheduled for shipment to another site?

Number of assemblies: _____

Site ID: _____ (See Appendix A, Table 2, Storage Site Codes)

C. Data on Discharged Fuel

Complete Section C for each group of assemblies which have these common characteristics: (Each group is to be reported on a separate page. If the assembly has a unique characteristic, it is in a group by itself. It is possible that a group may consist of one (1) assembly.)

Same owner
 Same storage site
 Same assembly type
 Same cycle/reactor history
 Same initial enrichment (within nearest 0.1 percent)
 Same initial loading weight (within 3 Kg for BWR, 5 Kg for PWR)
 Same final burnup (within 10% of the average)

Complete Section C.1.1 for all assemblies having these common characteristics for which no subsequent irradiation is planned or which were permanently discharged during the last reporting period.

Complete Section C.1.2 for all other assemblies discharged from the reactor during the last reporting period (i.e., temporarily discharged).

Complete Section C.1.3 for any assemblies which were reported as permanently discharged on the previous October 1983 Annex B submissions but which were reinserted for irradiation during this reporting period.

1. Historical Data

1.1 Group Description for Permanently Discharged Fuel

- a. Group Identifier: [] (Optional)
- b. Number of Assemblies in the Group: []
- c. Discharge Cycle No.: []
- d. Cycle Shutdown Date: _____ (CCYYMMDD)
- e. Contract Number: _____ (See Appendix A, Table 1, Contract Numbers)
- f. Group Location: _____ (See Appendix A, Table 2, Storage Site Codes)
- g. Fuel Assembly Type: _____ (See Appendix A, Table 3, Description of Fuel Assembly Types)
- h. Average Initial Enrichment: _____ (weight percentage to the nearest tenth percent)

- i. Average Assembly Weight: _____ in Kilograms of initial uranium
- j. Average Assembly Burnup: _____ GWD/MTU
- k. List the unique fuel assembly identifiers for the assemblies in this grouping:

(1) Current RW-859 Assembly Identifier	(2) ANSI Assembly Identifier	(3) Fuel Fabricator Assembly Identifier
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Note: Report ANSI Identifier if it is different from RW-859's. Report Fuel Fabricator Identifier if it is different from RW-859's, or it is a Non-ANSI Identifier. If they are the same, enter "same" in the ANSI and Fuel Fabricator Columns.

- l. Which of the above columns in 1.1.k. reflects the assembly identifiers reported on the DOE/NRC Form 741?
 _____(1) _____(2) _____(3) (check all that apply)

- m. Which of the above columns in 1.1.k. is stamped on the assembly?
 _____(1) _____(2) _____(3) (check all that apply)

1.2 Listing of Temporarily Discharged Fuel

NOTE: Temporarily discharged fuel is defined as fuel which was irradiated in the previous fuel cycle (cycle N) and not in the following fuel cycle (cycle N+1), and which you have definite plans to irradiate in a subsequent fuel cycle.

- a. Discharge Cycle No.: []
- b. Cycle End Date: _____ (CCYYMMDD)
- c. Number of assemblies _____

- d. List the unique fuel assembly identifiers for the assemblies meeting this description:

(1) Current RW-859 Assembly Identifier	(2) ANSI Assembly Identifier	(3) Fuel Fabricator Assembly Identifier
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Note: Report ANSI Identifier if it is different from RW-859's. Report Fuel Fabricator Identifier if it is different from RW-859's, or it is a Non-ANSI Identifier. If they are the same, enter "same" in the ANSI and Fuel Fabricator Columns.

- e. Which of the above columns in 1.2.d. reflects the assembly identifiers reported on the DOE/NRC Form 741?
 _____(1) _____(2) _____(3) (check all that apply)

- f. Which of the above columns in 1.2.d. is stamped on the assembly? _____(1) _____(2) _____(3) (check all that apply)

1.3 Changes in Permanently Discharged Status

List any assemblies which were reported as permanently discharged (on the October 1983 Annex B submission) but which have been reinserted during the last reporting period.

NOTE: These data are to be supplied when the assembly is actually reinserted into the reactor, not when you make a decision to reinsert a permanently discharged assembly.

NOTE: When the assemblies listed below are again permanently discharged they must be reported in Section II.C.1.1.

- a. List the unique fuel assembly identifiers for the assemblies meeting this description:

(1) Current RW-859 Assembly Identifier	(2) ANSI Assembly Identifier	(3) Fuel Fabricator Assembly Identifier
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Note: Report ANSI Identifier if it is different from RW-859's. Report Fuel Fabricator Identifier if it is different from RW-859's, or it is a Non-ANSI Identifier. If they are the same, enter "same" in the ANSI and Fuel Fabricator Columns.

- b. Which of the above columns in 1.3.a. reflects the assembly identifiers reported on the DOE/NRC Form 741?
 _____(1) _____(2) _____(3) (check all that apply)

- c. Which of the above columns in 1.3.a. is stamped on the assembly?
 _____(1) _____(2) _____(3) (check all that apply)

1.4 Defective Assembly Data

Please list the assemblies that were permanently discharged during the last reporting period and which are defective, or which were not reported as such on previous submissions.

NOTE: These assemblies MUST also be described in Section II.C.1.1. Canistered assemblies MUST also be described in Section II.D.3.

List only those assemblies which:

- Will not fit into your spent fuel racks,
- Cannot be lifted normally,
- Contain any fuel rods having known or suspected cladding defects greater than pin holes or hairline cracks that would require canning for shipment under the NRC Director's Decision, DD-84-9, April 1984.
- Have already been canistered.

Assembly ID 1.4(a)	Defect Code 1.4(b)	Canistered Yes or No 1.4(c)
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

If 1.4(c) is yes, complete Section II.D.3. If 1.4(c) is no, describe the nature and the extent of special treatment the utility plans for the assembly:

If a photograph or schematic would be of use, please provide appropriate drawings or photograph.

1.4(d) Defective Assembly Status

Please list the RW-859 assembly identifiers that have changed their defective fuel status to non-defective.

1.5 Assembly Identifiers Cross-Reference Table (All Historical Assemblies - Optional)

For this version of the Form RW-859, the completion of this cross-reference table on historical assembly identifiers is optional. In three years, when the Form RW-859 is again revised, the DOE intends to make completion of this table a mandatory requirement. DOE encourages utilities to submit the data now; EIA is available to assist in this process.

a.	(1)	(2)	(3)
	Current RW-859 Assembly Identifier	ANSI Assembly Identifier	Fuel Fabricator Assembly Identifier
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

Note: Report ANSI Identifier if it is different from RW-859's. Report Fuel Fabricator Identifier if it is different from RW-859's, or it is a Non-ANSI Identifier. If they are the same, enter "same" in the ANSI and Fuel Fabricator Columns.

b. Which of the above columns in 1.5.a. reflects the assembly identifiers reported on the DOE/NRC Form 741?
_____ (1) _____ (2) _____ (3) (check all that apply)

c. Which of the above columns in 1.5.a. is stamped on the assembly? _____ (1) _____ (2) _____ (3) (check all that apply)

2. Transportation Data

2.1 Shipment and Change of Ownership of Irradiated Fuel

Report any assemblies that were shipped to another storage site or which changed ownership during the last reporting period.

Group Description for Permanently Discharged Fuel Which Changed Storage Site or Ownership:

- a. Group Identifier: [] (Optional)
- b. Number of Assemblies in the Group: []
- c. Contract Number: _____ (See Appendix A, Table 1, Contract Numbers)
- d. Group Location: _____ (See Appendix A, Table 2, Storage Site Codes)
- e. Date of Shipment since the Submission of the Last Form: _____ (CCYYMM)
- f. Identify all spent fuel that has been shipped to another site:

(1)	(2)	(3)
RW-859 Reinserted Assembly Identifier	ANSI Assembly Identifier	Fuel Fabricator Assembly Identifier
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Note: Report ANSI Identifier if it is different from RW-859's. Report Fuel Fabricator Identifier if it is different from RW-859's, or it is a Non-ANSI Identifier. If they are the same, enter "same" in the ANSI and Fuel Fabricator Columns.

- g. Which of the above columns in 2.1.f. reflects the assembly identifiers reported on the DOE/NRC Form 741?
_____ (1) _____ (2) _____ (3) (check all that apply)
- h. Which of the above columns in 2.1.f. is stamped on the assembly? _____ (1) _____ (2) _____ (3) (check all that apply)

D. Inventory Data

1. Assemblies Most Recently Inserted

1.1 Listing of Reinserted Fuel

NOTE: Reinserted assemblies are defined as previously irradiated assemblies which were not inserted in the last cycle (Cycle N), but which are inserted in this cycle (Cycle N+1).

a. What is the number of reinserted assemblies in Cycle N + 1?
_____ (No. of assemblies)

b. List the unique fuel assembly identifiers for the reinserted fuel in Cycle N+1

(1) RW-859 Reinserted Assembly Identifier	(2) ANSI Assembly Identifier	(3) Fuel Fabricator Assembly Identifier	(4) Reactor ID in Which Prior Irradiation Occurred
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Note: Report ANSI Identifier if it is different from RW-859's. Report Fuel Fabricator Identifier if it is different from RW-859's, or it is a Non-ANSI Identifier. If they are the same, enter "same" in the ANSI and Fuel Fabricator Columns.

c. Which of the above columns in b. reflects the assembly identifiers reported on the DOE/NRC Form 741?
_____ (1) _____ (2) _____ (3) (check all that apply)

d. Which of the above columns in b. is stamped on the assembly?
_____ (1) _____ (2) _____ (3) (check all that apply)

1.2 Fresh Fuel Assemblies Inserted most Recently

List the characteristics of the fresh fuel assemblies inserted in the core during the past refueling outage. Groups are defined as in Question II.C.

- a. Group Identifier: _____
b. Number of Assemblies in the Group: _____
c. Fuel Assembly Type: _____
d. Average Assembly Weight: _____ in kilograms of initial uranium

e. Average Initial Enrichment: _____ (weight percentage to the nearest tenth percent)

f. Expected Discharge Burnup: _____ GWD/MTU

g. List the unique assembly identifiers for the assemblies in this group.

(1) Current RW-859 Assembly Identifier	(2) ANSI Assembly Identifier	(3) Fuel Fabricator Assembly Identifier
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Note: Report ANSI Identifier if it is different from RW-859's. Report Fuel Fabricator Identifier if it is different from RW-859's, or it is a Non-ANSI Identifier. If they are the same, enter "same" in the ANSI and Fuel Fabricator Columns.

h. Which of the above columns in g. reflects the assembly identifiers reported on the DOE/NRC Form 741?
_____ (1) _____ (2) _____ (3) (check all that apply)

i. Which of the above columns in g. is stamped on the assembly?
_____ (1) _____ (2) _____ (3) (check all that apply)

2. Cycle Projections

2.1 Projections of fresh fuel in cycles

Cycle Number	Cycle Shutdown Date (CCYYMM)	Number of Fresh Fuel Assemblies Inserted	Estimated Cycle Burnup (Effective Full) Power Days)
_____ (N+1)	_____	_____	_____
_____ (N+2)	_____	_____	_____
_____ (N+3)	_____	_____	_____
_____ (N+4)	_____	_____	_____
_____ (N+5)	_____	_____	_____

NOTE: For those reporting under option "(a) 90 days after a cycle startup," cycle "N" is the cycle whose shutdown prompted submission of this form as reported in question II.A.2.

2.2 Projections of permanently discharged fuel

Projections of permanently discharged fuel shall be reported on a group basis, where a group is defined in Section II.C. This information reflects the current plans of your company.

NOTE: Average initial enrichment in weight percent of initial uranium is to be reported to the nearest tenth of a percent.

[illegible]

<u>Number of Group Identifier (Optional)</u>	<u>Average Assemblies in the Group (Discharged)</u>	<u>Average Initial Enrichment (Weight %)</u>	<u>Average Assembly Weight (Kg)</u>	<u>Discharge Burnup (GWD/MTU)</u>
Cycle _____ (N+3)				
Cycle _____ (N+4)				
Cycle _____ (N+5)				

3. Canister Data

This section is to quantify all canisters, all materials in canisters, i.e., failed and non-failed fuel, and all nonfuel components not attached to assembly.

3.1 Summary of Historical Data

- a. What is the number of open baskets (i.e., rodlet or GAD baskets) with fuel and nonfuel components? _____

Nonfuel (Components Not Attached to Assembly)

- b. Do you canister nonfuel components? ____ Yes ____ No If yes, complete Canister-Specific Data below.

If no, are the nonfuel components still on site? ____ Yes ____ No
If they are still on site, please note in Section II.D.4.

- c. What is the number of canisters with nonfuel components at the storage site? _____

Fuel

- d. What is the number of canisters with fuel at the storage site?
_____ [BWR] _____ [PWR]

3.2 Canister-Specific Data

Complete for each canister:

- a. Canister ID: _____
ID tagged or stamped on canister? ____ Yes ____ No
- b. Canister Maximum Dimensions (including cap and canister):
Length: _____ (Exterior)
Width: _____ x _____ (Exterior)
Weight: _____ (kilograms of design weight when empty)
- c. Canister Type: Sealed _____ Vented _____
Start Date: [_____] (CCYYMM)
End Date: [_____] (CCYYMM)
- d. Canister Location (See Appendix A, Table 2, Storage Site Codes):

e. Canister Contents Information (check all that apply):

- _____ (1) Intact Fuel Assembly
_____ (2) Intact Fuel Rods from Consolidation, Reconstitution or Reconstruction
_____ (3) Other Fuel Debris (Fuel rod pieces, pellets, etc.)
_____ (4) Spent Fuel Disassembly Hardware
_____ (5) Nonfuel Components
_____ (6) Other Nonfuel Material

f.

Original Assembly ID	No. of Fuel Rods	Mass of Initial Uranium (kg)	Greater Than Class C Waste Y N or U ¹
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Footnotes:

1: Y for Yes, N for No, and U for Unknown

4. Noncanistered Nonfuel Components Data

Table (1)

PWR Combustion Engineering Reactors:	Noncanistered Components in Storage ¹	Number of Assemblies with These Components	Projected Storage (Incremental Amount for The Next Five Cycles) ²	Critical Dimensions (Length x Width x Height) ³
(a)	(b)	(c)	(d)	(e)
Control Element Assemblies (4/5 Rod)				
Control Element Assemblies (8 Rod)				
Control Element Assemblies (12 Rod)				
Neutron Sources				
Incore Instrumentation				
Cruciform Control Blades				
(Other)				

Footnotes:

- 1) Enter the number of these components which are in storage (either onsite or offsite) awaiting final disposal.
- 2) Enter the number of each of these components which you estimate will be in storage of this reactor in the next five cycles.
- 3) Dimension in inches.

4. Noncanistered Nonfuel Components Data (Continued)

Table (2)

PWR Westinghouse Reactors:	Noncanistered Components in Storage ¹	Number of Assemblies with These Components	Projected Storage (Incremental Amount for The Next Five Cycles) ²	Critical Dimensions (Length x Width x Height) ³
(a)	(b)	(c)	(d)	(e)
Burnable Poison Rod Assemblies				
Thimble Plugs				
Rod Cluster Control Assemblies				
Primary and Secondary Neutron Sources				
Incore Instrumentation				
Cruciform Control Blades				
(Other)				

Footnotes:

- 1) Enter the number of these components which are in storage (either onsite or offsite) awaiting final disposal.
- 2) Enter the number of each of these components which you estimate will be in storage of this reactor in the next five cycles.
- 3) Dimension in inches.

4. Noncanistered Nonfuel Components Data (Continued)

Table (3)

PWR Babcock & Wilcox Reactors:	Noncanistered Components in Storage ¹	Number of Assemblies with These Components	Projected Storage (Incremental Amount for The Next Five Cycles) ²	Critical Dimensions (Length x Width x Height) ³
(a)	(b)	(c)	(d)	(e)
Local Power Range Monitor				
Control Rod Assemblies				
Orifice Rods				
Primary Neutron Sources				
Regenerative Neutron Cluster Sources				
Burnable Poison Rod Assemblies				
Axial Power Shaping Rods				
Gray Axial Power Shaping Rods				
(Other)				

Footnotes:

- 1) Enter the number of these components which are in storage (either onsite or offsite) awaiting final disposal.
- 2) Enter the number of each of these components which you estimate will be in storage of this reactor in the next five cycles.
- 3) Dimension in inches.

4. Noncanistered Nonfuel Components Data (Continued)

Table (4)

BWR General Electric Reactors:	Noncanistered Components in Storage ¹	Number of Assemblies with These Components	Projected Storage (Incremental Amount for The Next Five Cycles) ²	Critical Dimensions (Length x Width x Height) ³
(a)	(b)	(c)	(d)	(e)
Local Power Range Monitors				
Fuel Channels ⁴				
Control Blades				
Poison Curtains				
Neutron Sources				
(Other)				

Footnotes:

- 1) Enter the number of these components which are in storage (either onsite or offsite) awaiting final disposal.
- 2) Enter the number of each of these components which you estimate will be in storage of this reactor in the next five cycles.
- 3) Dimension in inches.
- 4) Only the fuel channels that are already removed or will be removed from fuel assembly.

1. Have you reconstituted any fuel assemblies?
 _____Yes _____No

- a. If yes to E.1., how many assemblies? _____
- b. If yes to E.1., can you track the associated rods?
_____ Yes _____ No
- c. If yes to E.1.b., on what media do you keep your records?
_____ Paper _____ Electronic _____ Other

A. Comments

Please list any other comments you have regarding the form. If the comments relate to a specific Section number, please provide the Section number.

[illegible]

1. What would you do to improve the Form RW-859 or the associate software?

2. Estimate your reporting burden (per response) including the time receiving instructions, searching existing data sources, gathering and maintaining the data needed, and completing and returning the collected data and information (in person-hours). _____

Detailed Assembly Type Statistics

The spent fuel Characteristics Data Base (CDB) developed by Oak Ridge National Laboratory (ORNL) includes detailed information on physical, radiological, and quantitative characteristics of spent nuclear fuel. The physical characteristics are organized by assembly class and, within each assembly class, by assembly type codes (developed jointly by ORNL and the Energy Information Administration) to provide detailed information about each type. Included in this information are the length and width of the overall assembly and the individual fuel rods, the number of fuel rods, the type of material used in the cladding and other parts of the assembly, and detailed assembly drawings. An eight-character assembly type code links Form RW-859 survey data with the CDB.

The characteristics of fuel assemblies are important in many areas of radioactive waste management. Assembly dimensions are clearly a major concern for shipping cask and waste package designers. If the fuel is to be consolidated, knowledge of the individual assembly types is essential, from the rod array configuration to the location of the bolts and welds for disassembly. The composition of the assembly hardware and cladding is also important. For example, cobalt-60, a major activation product, is more concentrated in stainless steel than in zircaloy. Assembly type characteristics are summarized by assembly type and reactor and are further amplified by a CDB module referred to as "LWR Fuel Assemblies Data Base," as described in the four-volume publication, *Characteristics of Potential Repository Wastes* (DOE/RW-0184-R1).

Whereas the physical characteristics of assemblies are identified through the assembly type codes, the radiological data in the CDB are calculated based on the reactor type, discharge burnup, initial enrichment, and age from time of discharge. All these data are obtainable from Form RW-859. The radiological characteristics of the discharged assemblies are time-dependent and generally subject to the laws of exponential decay. The radiological characteristics in the CDB include grams, curies, and watts for more than 350 isotopes; photons for 18 gamma energy ranges; and neutrons.

This appendix provides detailed information on assembly type characteristics that is not included in the body of the report. These data are presented in table format and include the following:

- Fabricator Identifiers (Table B1)
- Assembly Class and Design Type by Utility (Table B2)
- Reactors by Assembly Class and Design Type (Table B3)
- Descriptions of Assembly Types (Table B4)
- Assembly Characteristics by Assembly Type (Table B5)
- Assembly Type Summary by Reactor (Table B6)
- Assembly Type Summary by Assembly Type (Table B7)
- Spent Fuel Assemblies, by Type, Discharged by Year (Table B8)
- Initial Uranium Content of Spent Fuel Assemblies, by Type, Discharged by Year (Table B9)
- Burnup of Spent Fuel Assemblies, by Type, Discharged by Year (Table B10).

The fuel assembly types throughout Appendix B have been listed in the following manner:

- The primary ordering criterion is assembly class—only assembly types within a reactor's particular assembly class are used at that reactor
- Within an assembly class, the secondary ordering criterion is fabricator. All fuel assembly types fabricated by the primary fuel fabricator (typically the reactor vendor) are listed first, followed by other fabricators in a generally alphabetical manner
- Within a fabricator in an assembly class, the primary ordering criterion is chronology. Earlier versions of fuels are listed first, more recent versions are listed later. This ordering is not absolute, but is based on the progression of designs over time.

The detailed assembly type table statistics presented in Appendix B use the eight-character assembly type code. The eight-character code is used exclusively for Form RW-859 submissions and in the CDB.

The code is presented as follows:

8-Character Code W1414ATR

The first three characters of the code identify the assembly class and are fully compatible with the CDB scheme. The

W14 in the example indicates Westinghouse (WE) 14 x 14 assembly class. All reactor-specific assembly type codes have an "X" as the first characteristic of the eight-character code (i.e., XHN indicates Haddam Neck). The next two characters identify the array size (14 = 14 x 14). The sixth character represents the fuel vendor [i.e., A for Advanced Nuclear Fuel (formerly Exxon Nuclear)]. The last two characters are a discriminator code that is designed to distinguish two fuel assembly types that are otherwise the same. The TR in the example indicates a top rod version.

Examples of discriminator codes that are used as the last two characters are:

<u>Discriminator</u>	<u>Meaning</u>	<u>Assembly Type Code</u>
· L	Low parasitic fuel (LOPAR), zircaloy guide tubes	W1414WL W1515WL
· O	Optimized Fuel Assembly (OFA), zircaloy spacers, smaller fuel rods	W1414WO W1515WO W1717WO
· 5	GE-5 fuel design (original retrofit fuel)	G2308G5 G4608G5
· P	Prepressurized BWR fuel rods	G2308GP G4608GP

A fuel rod, used in a nuclear power reactor, consists of uranium dioxide (UO₂) pellets encapsulated in a metal tube that is sealed at both ends. A fuel assembly is fabricated from a number of individual fuel rods arranged in arrays. The arrays are generally square, and have been made in many different dimensions. There are 134 reactor fuel assembly types which have been, or will be used. Each assembly type has certain distinguishing characteristics, such as the number of rods per assembly, fuel rod diameter, cladding type, materials used in fabrication, and other design features. The fuel assembly fabricator, the specific reactor

and fuel models are characteristics often used to describe or name assembly types.

Assembly classes generally refer to generic groupings of assembly types designed for a particular class of reactor (for example, WE 14 x 14 class reactors). Assembly classes can also be reactor-specific, because in some cases fuel assembly arrays are configured to fit only one reactor (i.e., the Big Rock Point reactor). The fabricator of an assembly for a given reactor is not necessarily related to the reactor vendor or to the original fuel fabricator.

Table B1. Fabricator Identifiers

Current Fabricator Name	Other Names Used	Nuclear Steam System Supplier ^a	Code
ABB Combustion Engineering	Combustion Engineering ABB Atom (ABB)	CE	C
Allis Chalmers		AC	L
Babcock & Wilcox Company		B&W	B
GE Nuclear Energy	General Electric	GE	G
General Atomics	Gulf General Atomics (GGA) Gulf/United Nuclear Fuels (GULF)	GA	H
Nuclear Fuel Services		NFS	N
Nuclear Materials and Equipment Corporation	NUMEC	NU	M
Siemens Nuclear Corporation	Advanced Nuclear Fuel Corporation (ANF) Exxon Nuclear Corporation (EXA) Jersey Nuclear	SIEM	A
United Nuclear Corporation		UNC	U
Westinghouse Electric		WE	W

^aData obtained from Nuclear Regulatory Commission, *Information Digest 1995*, (March 1995), Appendix A.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table B2. Assembly Class and Design Type by Utility

Electric Utility Name	Reactor Name	Reactor ID	Assembly Class	Nuclear Steam System Supplier ^a	Design Type ^b
Alabama Power Company	Farley 1	0101	WE 17 X 17	WE	3LP
	Farley 2	0102	WE 17 X 17	WE	3LP
Arizona Public Service Company	Palo Verde 1	0301	CE System 80	CE	CE80
	Palo Verde 2	0302	CE System 80	CE	CE80
	Palo Verde 3	0303	CE System 80	CE	CE80
Arkansas Power and Light Company	Arkansas Nuclear 1	0401	BW 15 X 15	B&W	LLP
	Arkansas Nuclear 2	0402	CE 16 X 16	CE	CE
Baltimore Gas and Electric Company	Calvert Cliffs 1	0501	CE 14 X 14	CE	CE
	Calvert Cliffs 2	0502	CE 14 X 14	CE	CE
Boston Edison Company	Pilgrim 1	0601	GE BWR/2,3	GE	3
Carolina Power and Light Company	Brunswick 1	0701	GE BWR/4-6	GE	4
	Brunswick 2	0702	GE BWR/4-6	GE	4
	Harris 1	0703	WE 17 X 17	WE	3LP
	Robinson 2	0705	WE 15 X 15	WE	3LP
Cleveland Electric Illuminating Company	Perry 1	0901	GE BWR/4-6	GE	6
Commonwealth Edison Company	Braidwood 1	1001	WE 17 X 17	WE	4LP
	Braidwood 2	1002	WE 17 X 17	WE	4LP
	Byron 1	1003	WE 17 X 17	WE	4LP
	Byron 2	1004	WE 17 X 17	WE	4LP
	Dresden 1	1005	Dresden 1	GE	1
	Dresden 2	1006	GE BWR/2,3	GE	3
	Dresden 3	1007	GE BWR/2,3	GE	3
	LaSalle County 1	1008	GE BWR/4-6	GE	5
	LaSalle County 1	1009	GE BWR/4-6	GE	5
	Quad Cities 1	1010	GE BWR/2,3	GE	3
	Quad Cities 2	1011	GE BWR/2,3	GE	3
	Zion 1	1012	WE 15 X 15	WE	4LP
	Zion 2	1013	WE 15 X 15	WE	4LP
Consolidated Edison Company of New York	Indian Point 1	1101	Indian Point 1	B&W	--
	Indian Point 2	1102	WE 15 X 15	WE	4LP
Consumers Power Company	Big Rock Point	1201	Big Rock Point	GE	1
	Palisades	1204	Palisades	CE	CE
Dairyland Power Cooperative	LaCrosse	1301	LaCrosse	AC	--
Detroit Edison Company	Enrico Fermi 2	1402	GE BWR/4-6	GE	4

See footnotes at end of table.

Table B2. Assembly Class and Design Type by Utility (Continued)

Electric Utility Name	Reactor Name	Reactor ID	Assembly Class	Nuclear Steam System Supplier ^a	Design Type ^b
Duke Power Company	Catawba 1	1501	WE 17 X 17	WE	4LP
	Catawba 2	1502	WE 17 X 17	WE	4LP
	McGuire 1	1504	WE 17 X 17	WE	4LP
	McGuire 2	1505	WE 17 X 17	WE	4LP
	Oconee 1	1506	BW 15 X 15	B&W	LLP
	Oconee 2	1507	BW 15 X 15	B&W	LLP
	Oconee 3	1508	BW 15 X 15	B&W	LLP
Duquesne Light Company	Beaver Valley 1	1601	WE 17 X 17	WE	3LP
	Beaver Valley 2	1602	WE 17 X 17	WE	3LP
Florida Power Corporation	Crystal River 3	1701	BW 15 X 15	B&W	LLP
Florida Power and Light Company	St. Lucie 1	1801	CE 14 X 14	CE	CE
	St. Lucie 2	1802	St. Lucie 2	CE	CE
	Turkey Point 3	1803	WE 15 X 15	WE	3LP
	Turkey Point 4	1804	WE 15 X 15	WE	3LP
Georgia Power Company	Hatch 1	2001	GE BWR/4-6	GE	4
	Hatch 2	2002	GE BWR/4-6	GE	4
	Vogtle 1	2003	WE 17 X 17	WE	4LP
	Vogtle 2	2004	WE 17 X 17	WE	4LP
GPU Nuclear Corporation	Three Mile Island 1	1901	BW 15 X 15	B&W	LLP
	Oyster Creek	1903	GE BWR/2,3	GE	2
Gulf States Utilities Company	River Bend 1	2101	GE BWR/4-6	GE	6
Houston Lighting and Power Company	South Texas 1	2201	South Texas	WE	4LP
	South Texas 2	2202	South Texas	WE	4LP
IES Utilities, Inc.	Duane Arnold	2401	GE BWR/4-6	GE	4
Illinois Power Company	Clinton 1	2301	GE BWR/4-6	GE	6
Indiana Michigan Power Company	Cook 1	5801	WE 15 X 15	WE	4LP
	Cook 2	5802	WE 17 X 17	WE	4LP
Kansas Gas and Electric Company	Wolf Creek 1	2501	WE 17 X 17	WE	4LP
Long Island Power Authority	Shoreham	2601	GE BWR/4-6	GE	4
Louisiana Power and Light Company	Waterford 3	2701	CE 16 X 16	CE	CE
Maine Yankee Atomic Power Company	Maine Yankee	2801	CE 14 X 14	CE	CE

See footnotes at end of table.

Table B2. Assembly Class and Design Type by Utility (Continued)

Electric Utility Name	Reactor Name	Reactor ID	Assembly Class	Nuclear Steam System Supplier ^a	Design Type ^b
Nebraska Public Power District	Cooper Station	3001	GE BWR/4-6	GE	4
New York Power Authority	FitzPatrick	3901	GE BWR/4-6	GE	4
	Indian Point 3	3902	WE 15 X 15	WE	4LP
Niagara Mohawk Power Corporation	Nine Mile Point 1	3101	GE BWR/2,3	GE	2
	Nine Mile Point 2	3102	GE BWR/4-6	GE	5
North Atlantic Energy Service Corporation	Seabrook	5901	WE 17 X 17	WE	4LP
Northeast Utilities Service Company	Millstone 1	3201	GE BWR/2,3	GE	3
	Millstone 2	3202	CE 14 X 14	CE	CE
	Millstone 3	3203	WE 17 X 17	WE	4LP
	Haddam Neck	5701	Haddam Neck	WE	4LP
Northern States Power Company	Monticello	3301	GE BWR/2,3	GE	3
	Prairie Island 1	3302	WE 14 X 14	WE	2LP
	Prairie Island 2	3303	WE 14 X 14	WE	2LP
Omaha Public Power District	Fort Calhoun	3401	Fort Calhoun	CE	CE
Pacific Gas and Electric Company	Diablo Canyon 1	3501	WE 17 X 17	WE	4LP
	Diablo Canyon 2	3502	WE 17 X 17	WE	4LP
	Humboldt Bay	3503	Humboldt Bay	GE	1
PECO Energy Company	Limerick 1	3701	GE BWR/4-6	GE	4
	Limerick 2	3702	GE BWR/4-6	GE	4
	Peach Bottom 2	3704	GE BWR/4-6	GE	4
	Peach Bottom 3	3705	GE BWR/4-6	GE	4
Pennsylvania Power and Light Company	Susquehanna 1	3601	GE BWR/4-6	GE	4
	Susquehanna 2	3602	GE BWR/4-6	GE	4
Portland General Electric Company	Trojan	3801	WE 17 X 17	WE	4LP
Public Service Electric and Gas Company	Hope Creek	4201	GE BWR/4-6	GE	4
	Salem 1	4202	WE 17 X 17	WE	4LP
	Salem 2	4203	WE 17 X 17	WE	4LP
Rochester Gas and Electric Corporation	Ginna	4401	WE 14 X 14	WE	2LP
Sacramento Municipal Utility District	Rancho Seco	4501	BW 15 X 15	B&W	LLP

See footnotes at end of table.

Table B2. Assembly Class and Design Type by Utility (Continued)

Electric Utility Name	Reactor Name	Reactor ID	Assembly Class	Nuclear Steam System Supplier ^a	Design Type ^b
South Carolina Electric and Gas Company	Summer	4601	WE 17 X 17	WE	3LP
Southern California Edison Company	San Onofre 1	4701	San Onofre 1	WE	3LP
	San Onofre 2	4702	CE 16 X 16	CE	CE
	San Onofre 3	4703	CE 16 X 16	CE	CE
System Energy Resources, Inc.	Grand Gulf 1	2901	GE BWR/4-6	GE	6
Tennessee Valley Authority	Browns Ferry 1	4803	GE BWR/4-6	GE	4
	Browns Ferry 2	4804	GE BWR/4-6	GE	4
	Browns Ferry 3	4805	GE BWR/4-6	GE	4
	Sequoyah 1	4808	WE 17 X 17	WE	4LP
	Sequoyah 2	4809	WE 17 X 17	WE	4LP
	Watts Bar 1	4810	WE 17 X 17	WE	4LP
Toledo Edison Company	Davis-Besse	5001	BW 15 X 15	B&W	LLP
TU Electric	Comanche Peak 1	4901	WE 17 X 17	WE	4LP
	Comanche Peak 2	4902	WE 17 X 17	WE	4LP
Union Electric Company	Callaway	5101	WE 17 X 17	WE	4LP
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	6001	GE BWR/4-6	GE	4
Virginia Power	North Anna 1	5201	WE 17 X 17	WE	3LP
	North Anna 2	5202	WE 17 X 17	WE	3LP
	Surry 1	5203	WE 15 X 15	WE	3LP
	Surry 2	5204	WE 15 X 15	WE	3LP
Washington Public Power Supply System	Washington Nuclear 2	5302	GE BWR/4-6	GE	5
Wisconsin Electric Power Company	Point Beach 1	5401	WE 14 X 14	WE	2LP
	Point Beach 2	5402	WE 14 X 14	WE	2LP
Wisconsin Public Service Corporation	Kewaunee	5501	WE 14 X 14	WE	2LP
Yankee Atomic Electric Company	Yankee Rowe	5601	Yankee Rowe	WE	4LP

^aNuclear Steam System Supplier (NSSS) codes are as follows: AC = Allis Chalmers; B&W = Babcock & Wilcox Company; CE = Combustion Engineering; GE = GE Nuclear Energy; WE = Westinghouse Electric. Data obtained from Nuclear Regulatory Commission, *Information Digest 1995*, (March 1995), Appendix A.

^bDesign types are as follows: 1 = GE Type 1; 2 = GE Type 2; 3 = GE Type 3; 4 = GE Type 4; 5 = GE Type 5; 6 = GE Type 6; 2LP = Westinghouse Two-Loop; 3LP = Westinghouse Three-Loop; 4LP = Westinghouse Four-Loop; CE = Combustion Engineering; CE80 = CE Standard Design; LLP = B&W Lowered Loop. Data obtained from Nuclear Regulatory Commission publication *Information Digest 1995*, (March 1995), Appendix A.

-- = Not applicable.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table B3. Reactors by Assembly Class and Design TypeB&W 15 X 15 Assembly Class

Arkansas Nuclear 1 (LLP)	Crystal River 3 (LLP)	Davis-Besse (LLP)
Oconee 1 (LLP)	Oconee 2 (LLP)	Oconee 3 (LLP)
Rancho Seco (LLP)*	Three Mile Island 1 (LLP)	

B&W 17 X 17 Assembly Class

(4 test assemblies irradiated at Oconee 1, 2, & 3)

CE 14 X 14 Assembly Class

Calvert Cliffs 1 (CE)	Calvert Cliffs 2 (CE)	Maine Yankee (CE)
Millstone 2 (CE)	St. Lucie 1 (CE)	

CE 16 X 16 Assembly Class

Arkansas Nuclear 2 (CE)	San Onofre 2 (CE)	San Onofre 3 (CE)
Waterford 3 (CE)		

CE 16 X 16 System 80 Assembly Class

Palo Verde 1 (CE80)	Palo Verde 2 (CE80)	Palo Verde 3 (CE80)
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GE BWR/2,3 Assembly Class

Dresden 2 (3)	Dresden 3 (3)	Millstone 1 (3)
Monticello (3)	Nine Mile Point 1 (2)	Oyster Creek (2)
Pilgrim 1 (3)	Quad Cities 1 (3)	Quad Cities 2 (3)

GE BWR/4-6 Assembly Class

Browns Ferry 1 (4)	Browns Ferry 2 (4)	Browns Ferry 3 (4)
Brunswick 1 (4)	Brunswick 2 (4)	Clinton 1 (6)
Cooper Station (4)	Duane Arnold (4)	Enrico Fermi 2 (4)
FitzPatrick (4)	Grand Gulf 1 (6)	Hatch 1 (4)
Hatch 2 (4)	Hope Creek (4)	LaSalle County 1 (5)
LaSalle County 2 (5)	Limerick 1 (4)	Limerick 2 (4)
Nine Mile Point 2 (5)	Peach Bottom 2 (4)	Peach Bottom 3 (4)
Perry 1 (6)	River Bend 1 (6)	Shoreham (4)*
Susquehanna 1 (4)	Susquehanna 2 (4)	Vermont Yankee (4)
Washington Nuclear 2 (5)		

WE 14 X 14 Assembly Class

GINNA (2LP)	Kewaunee (2LP)	Point Beach 1 (2LP)
Point Beach 2 (2LP)	Prairie Island 1 (2LP)	Prairie Island 2 (2LP)

WE 15 X 15 Assembly Class

Cook 1 (4LP)	Indian Point 2 (4LP)	Indian Point 3 (4LP)
Robinson 2 (3LP)	Surry 1 (3LP)	Surry 2 (3LP)
Turkey Point 3 (3LP)	Turkey Point 4 (3LP)	Zion 1 (4LP)
Zion 2 (4LP)		

See footnotes at end of table.

Table B3. Reactors by Assembly Class and Design Type (Continued)WE 17 X 17 Assembly Class

Beaver Valley 1 (3LP)	Beaver Valley 2 (3LP)	Braidwood 1 (4LP)
Braidwood 2 (4LP)	Byron 1 (4LP)	Byron 2 (4LP)
Callaway (4LP)	Catawba 1 (4LP)	Catawba 2 (4LP)
Comanche Peak 1 (4LP)	Comanche Peak 2 (4LP)	Cook 2 (4LP)
Diablo Canyon 1 (4LP)	Diablo Canyon 2 (4LP)	Farley 1 (3LP)
Farley 2 (3LP)	Harris 1 (3LP)	McGuire 1 (4LP)
McGuire 2 (4LP)	Millstone 3 (4LP)	North Anna 1 (3LP)
North Anna 2 (3LP)	Salem 1 (4LP)	Salem 2 (4LP)
Seabrook (4LP)	Sequoyah 1 (4LP)	Sequoyah 2 (4LP)
Summer (3LP)	Trojan (4LP)*	Vogtle 1 (4LP)
Vogtle 2 (4LP)	Watts Bar 1 (4LP)	Wolf Creek 1 (4LP)

South Texas Assembly Class

South Texas 1 (4LP)	South Texas 2 (4LP)
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Single Reactor Assembly Classes

Big Rock Point (1)	Dresden 1 (1)*	Fort Calhoun (CE)
Humboldt Bay (1)*	Haddam Neck (4LP)	Indian Point 1 (--)*
LaCrosse (--)*	Palisades (CE)	St. Lucie 2 (CE)
San Onofre 1 (3LP)*	Yankee Rowe (4LP)*	

* = Reactors are permanently shut down; -- = Not applicable.

Notes: Design types are as follows: 1 = GE Type 1; 2 = GE Type 2; 3 = GE Type 3; 4 = GE Type 4; 5 = GE Type 5; 6 = GE Type 6; 2LP = Westinghouse Two-Loop; 3LP = Westinghouse Three-Loop; 4LP = Westinghouse Four-Loop; CE = Combustion Engineering; CE80 = CE Standard Design; LLP = B&W Lowered Loop. Data obtained from Nuclear Regulatory Commission, *Information Digest 1995*, (March 1995), Appendix A.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table B4. Descriptions of Assembly Types

Assembly Type	Description	Assembly Type Code
<p align="center">B&W 15 X 15 Assembly Class (Reactor Type: PWR / Length: 165.7 in. / Width: 8.54 in.)</p>		
B&W 15 X 15 B&W Mark B2	B&W-manufactured fuel for B&W 15 X 15 reactors; Mark B2 fuel uses a corrugated flexible grid spacer and a zirconium dioxide solid spacer between the fuel column and the fuel rod end plug; ~464 kg U.	B1515B2
B&W 15 X 15 B&W Mark B3	B&W-manufactured fuel for B&W 15 X 15 reactors; Mark B3 characteristics are not well defined because it is an early fuel design; ~464 kg U.	B1515B3
B&W 15 X 15 B&W Mark B4	B&W-manufactured fuel for B&W 15 X 15 reactors; standard fuel from B&W for many years; Inconel spacer grids; ~464 kg U.	B1515B4
B&W 15 X 15 B&W Mark B4Z	B&W-manufactured fuel for B&W 15 X 15 reactors; features 6 zircaloy grid spacers in the core zone; ~464 kg U.	B1515B4Z
B&W 15 X 15 B&W Mark B5	B&W-manufactured fuel for B&W 15 X 15 reactors; redesigned upper end fitting eliminates retainers for Burnable Poison Rod Assembly holddown; redesigned holddown spring made of Inconel 718 rather than Inconel X-750; ~464 kg U.	B1515B5
B&W 15 X 15 B&W Mark B5Z	B&W-manufactured fuel for B&W 15 X 15 reactors; features 6 zircaloy grid spacers in the core zone; redesigned upper end fitting eliminates retainers for Burnable Poison Rod Assembly holddown; redesigned holddown spring made of Inconel 718 rather than Inconel X-750; ~464 kg U.	B1515B5Z
B&W 15 X 15 B&W Mark B6	B&W-manufactured fuel for B&W 15 X 15 reactors; features 6 zircaloy grid spacers in the core zone; skirtless and removable upper end fitting; ~464 kg U.	B1515B6
B&W 15 X 15 B&W Mark B7	B&W-manufactured fuel for B&W 15 X 15 reactors; Mark B6 features; slightly longer fuel rods and shorter lower end fitting; features increase the plenum volume and fuel rod-to-nozzle gap, allowing for increased discharge burnups; ~464 kg U.	B1515B7
B&W 15 X 15 B&W Mark B8	B&W-manufactured fuel for B&W 15 X 15 reactors; Mark B7 features; debris fretting resistant fuel rod design; ~464 kg U.	B1515B8
B&W 15 X 15 B&W Mark B9	B&W-manufactured fuel for B&W 15 X 15 reactors; Mark B8 features; slightly increased pellet diameter and reduced stack length; ~464 kg U.	B1515B9
B&W 15 X 15 B&W Mark B10	B&W-manufactured fuel for B&W 15 X 15 reactors; Mark B9 features; redesigned upper end fitting (helical holddown springs replaced by cruciform leaf-spring design); zone-loaded fuel enrichment variations; ~464 kg U.	B1515B10

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
B&W 15 X 15 Assembly Class (Continued) (Reactor Type: PWR / Length: 165.7 in. / Width: 8.54 in.)		
B&W 15 X 15 B&W Mark B	B&W-manufactured fuel for B&W 15 X 15 reactors; Mark B is a generic designation and is used when the specific assembly type is unknown; ~464 kg U.	B1515B
B&W 15 X 15 B&W Zirc Grids	B&W-manufactured fuel for B&W 15 X 15 reactors; generic designation for fuels with zircaloy grid spaces which encompasses Mark B4Z, B5Z, B6, B7 and B8 fuels when specific assembly type has not been determined; ~464 kg U.	B1515BZ
B&W 15 X 15 B&W Mark BEB	B&W-manufactured fuel for B&W 15 X 15 reactors; designed to test extended burnup features, this fuel had a shorter active fuel length and was used only as lead test assemblies at Arkansas Nuclear 1; ~464 kg U.	B1515BEB
B&W 15 X 15 B&W Mark BGd	B&W-manufactured fuel for B&W 15 X 15 reactors; used as lead test assemblies at Oconee 1; this fuel utilized gadolinia in the fuel rods as a neutron absorber; apparently had removable upper end fittings, the forerunner of the skirtless (Mark B6) upper end fitting; ~430 kg U.	B1515BGD
B&W 15 X 15 WE	WE-manufactured fuel for B&W 15 X 15 reactors; used as lead test assemblies at Three Mile Island 1; ~462 kg U.	B1515W
B&W 17 X 17 Assembly Class (Reactor Type: PWR / Length: 165.7 in. / Width: 8.54 in.)		
B&W 17 X 17 B&W Mark C	B&W-manufactured fuel for B&W 17 X 17 reactors; lead test assemblies used at Oconee 1, 2, & 3; ~456 kg U.	B1717B
CE 14 X 14 Assembly Class (Reactor Type: PWR / Length: 157 in. / Width: 8.1 in.)		
CE 14 X 14 CE	CE-manufactured fuel for CE 14 X 14 reactors; ~382 kg U.	C1414C
CE 14 X 14 ANF	ANF-manufactured fuel for CE 14 X 14 reactors; ~370 kg U.	C1414A
CE 14 X 14 WE	WE-manufactured fuel for CE 14 X 14 reactors; ~407 kg U.	C1414W
CE 16 X 16 Assembly Class (Reactor Type: PWR / Length: 176.8 in. / Width: 8.1 in.)		
CE 16 X 16 CE	CE-manufactured fuel for CE 16 X 16 reactors; ~416 kg U.	C1616CSD
CE 16 X 16 System 80 Assembly Class (Reactor Type: PWR / Length: 178.3 in. / Width: 8.1 in.)		
CE 16 X 16 CE System 80	CE-manufactured fuel for CE System 80 reactors; ~413 kg U.	C8016C

GE BWR/2,3 Assembly Class

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
(Reactor Type: BWR / Length: 171.2 in. / Width: 5.44 in.)		
GE BWR/2,3 7 X 7 GE-2a	GE-manufactured fuel for GE BWR/2,3 reactors; original core fuel at Oyster Creek, Nine Mile Point 1, and Millstone 1; fuel rod diameter of 0.570 in.; ~195 kg U.	G2307G2A
GE BWR/2,3 7 X 7 GE-2b	GE-manufactured fuel for GE BWR/2,3 reactors; original core fuel at other reactors; fuel rod diameter of 0.563 in.; cladding thickness of 0.032 in.; ~193 kg U.	G2307G2B
GE BWR/2,3 7 X 7 GE-3	GE-manufactured fuel for GE BWR/2,3 reactors; "Improved" fuel; cladding thickness of 0.037 in.; hydrogen getter introduced; ~188 kg U.	G2307G3
GE BWR/2,3 8 X 8 GE-4	GE-manufactured fuel for GE BWR/2,3 reactors; first 8 X 8 fuel design; 1 water rod; ~184 kg U.	G2308G4
GE BWR/2,3 8 X 8 GE-5	GE-manufactured fuel for GE BWR/2,3 reactors; "retrofit" fuel; 2 water rods; natural uranium axial blankets; ~177 kg U.	G2308G5
GE BWR/2,3 8 X 8 Prepres.	GE-manufactured fuel for GE BWR/2,3 reactors; fuel rods prepressurized to 3 atmospheres (atm) of He; 2 water rods; ~177 kg U.	G2308GP
GE BWR/2,3 8 X 8 Barrier	GE-manufactured fuel for GE BWR/2,3 reactors; pure zirconium "barrier" on inside of cladding to reduce pellet-clad interaction; ~177 kg U.	G2308GB
GE BWR/2,3 8 X 8 GE-8a	GE-manufactured fuel for GE BWR/2,3 reactors; features of GE BWR/2,3 8 X 8 fuel with only 2 water rods; ~177 kg U.	G2308G8A
GE BWR/2,3 8 X 8 GE-8b	GE-manufactured fuel for GE BWR/2,3 reactors; 4 water rods; introduces axially zoned enrichments and burnable absorbers; fuel rod prepressurization increased to 5 atm of He; ~172 kg U.	G2308G8B
GE BWR/2,3 8 X 8 GE-9	GE-manufactured fuel for GE BWR/2,3 reactors; ferrule-type spacer grids; large diameter water rod which spans 4 fuel rod positions; axially zoned enrichment and burnable absorbers; fuel rod prepressurization of 5 atm of He; "barrier" cladding; ~172 kg U.	G2308G9
GE BWR/2,3 8 X 8 GE-10	GE-manufactured fuel for GE BWR/2,3 reactors; fuel channel is 100-mils thick at corners and 65-mils thick on sides reducing the parasitic material in core; uses flow directors on the inside of the channel thus redirecting the flow of water away from the channel wall towards the center of the fuel bundle; estimated 172 kg U.	G2308G10

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
GE BWR/2,3 Assembly Class (Continued) (Reactor Type: BWR / Length: 171.2 in. / Width: 5.44 in.)		
GE BWR/2,3 9 X 9 GE-11	GE-manufactured fuel for GE BWR/2,3 reactors; uses 2 medium diameter water rods which spans 7 fuel rod positions; 8 part-length fuel rods; no weight available.	G2309G11
GE BWR/2,3 10 X 10 GE-12	GE-manufactured fuel for GE BWR/2,3 reactors; 10 X 10 fuel rod array; corresponding lower linear heat generation rate, part-length fuel rods, low pressure drop spacer; no weight available.	G2310G12
GE BWR/2,3 9 X 9 GE-13	GE-manufactured fuel for GE BWR/2,3 reactors; 9 X 9 fuel rod array; ferrule spacer, increased bundle weight relative to GE-11 fuel, choice of active fuel lengths; offers critical power capability improvements; no weight available.	G2309G13
GE BWR/2,3 7 X 7 ANF	ANF-manufactured fuel for GE BWR/2,3 reactors; 7 X 7 fuel rod array; used only at Oyster Creek; ~182 kg U.	G2307A
GE BWR/2,3 8 X 8 ANF	ANF-manufactured fuel for GE BWR/2,3 reactors; 8 X 8 fuel rod array; 1 water rod; estimated 175 kg U.	G2308A
GE BWR/2,3 8 X 8 ANF Prepres.	ANF-manufactured fuel for GE BWR/2,3 reactors; rods prepressurized with He to several atms; ~175 kg U.	G2308AP
GE BWR/2,3 9 X 9 ANF	ANF-manufactured fuel for GE BWR/2,3 reactors; 9 X 9 fuel rod array; 2 water rods; ~168 kg U.	G2309A
GE BWR/2,3 9 X 9 ANF 9-5	ANF-manufactured fuel for GE BWR/2,3 reactors; 5 water rods per assembly; estimated 161 kg U.	G2309A5
GE BWR/2,3 9 X 9 ANF 9X	ANF-manufactured fuel for GE BWR/2,3 reactors; central water channel spans 9 fuel rod positions; estimated 153 kg U.	G2309A9X
GE BWR/2,3 9 X 9 ANF IX	ANF-manufactured fuel for GE BWR/2,3 reactors; central water channel spans 9 fuel rod positions; fuel rods utilize internal cladding of pure zirconium; estimated 153 kg U.	G2309AIX
GE BWR/4-6 Assembly Class (Reactor Type: BWR / Length: 176.2 in. / Width: 5.44 in.)		
GE BWR/4-6 7 X 7 GE-2	GE-manufactured fuel for GE BWR/4-6 reactors; original core fuel for several BWR/4 plants; high failure rate instigated introduction of GE-3 and GE-4 fuels; ~195 kg U.	G4607G2
GE BWR/4-6 7 X 7 GE-3a	GE-manufactured fuel for GE BWR/4-6 reactors; "Improved" fuel; cladding thickness of 0.037 in.; hydrogen getter introduced; 144 inch active fuel length; ~187 kg U.	G4607G3A

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
GE BWR/4-6 Assembly Class (Continued) (Reactor Type: BWR / Length: 176.2 in. / Width: 5.44 in.)		
GE BWR/4-6 7 X 7 GE-3b	GE-manufactured fuel for GE BWR/4-6 reactors; "Improved" fuel; cladding thickness of 0.037 in.; hydrogen getter introduced; 146 in. active fuel length; ~190 kg U.	G4607G3B
GE BWR/4-6 8 X 8 GE-4a	GE-manufactured fuel for GE BWR/4-6 reactors; first 8 X 8 fuel design; 1 water rod; 144 in. active fuel length; ~184 kg U.	G4608G4A
GE BWR/4-6 8 X 8 GE-4b	GE-manufactured fuel for GE BWR/4-6 reactors; first 8 X 8 fuel design; 1 water rod; 146 in. active fuel length; ~187 kg U.	G4608G4B
GE BWR/4-6 8 X 8 GE-5	GE-manufactured fuel for GE BWR/4-6 reactors; "retrofit" fuel; 2 water rods; natural uranium axial blankets; ~183 kg U.	G4608G5
GE BWR/4-6 8 X 8 GE Prepres.	GE-manufactured fuel for GE BWR/4-6 reactors; fuel rods prepressurized to 3 atm of He; 2 water rods; ~183 kg U.	G4608GP
GE BWR/4-6 8 X 8 Barrier	GE-manufactured fuel for GE BWR/4-6 reactors; pure zirconium "barrier" on inside of cladding to reduce pellet-clad interaction; ~185 kg U.	G4608GB
GE BWR/4-6 8 X 8 GE-8	GE-manufactured fuel for GE BWR/4-6 reactors; 4 water rods; axially zoned enrichment and burnable absorbers; fuel rod prepressurization increased to 5 atm of He; other "barrier" fuel features; ~179 kg U.	G4608G8
GE BWR/4-6 8 X 8 GE-9	GE-manufactured fuel for GE BWR/4-6 reactors; ferrule-type spacer grids; large diameter water rod which spans 4 fuel rod positions; axially zoned enrichment and burnable absorbers; fuel rod prepressurization of 5 atm of He; "barrier" cladding; ~172 kg U.	G4608G9
GE BWR/4-6 8 X 8 GE-10	GE-manufactured fuel for GE BWR/4-6 reactors; fuel channel is 100 mils thick at corners and 65 mils thick on sides, reducing the parasitic material in core; uses flow directors on the inside of the channel thus redirecting the flow of water away from the channel wall towards the center of the fuel bundle; estimated 177 kg U.	G4608G10
GE BWR/4-6 9 X 9 GE-11	GE-manufactured fuel for GE BWR/4-6 reactors; uses 2 medium diameter water rods which spans 7 fuel rod positions; 8 part-length fuel rods; estimated 170 kg U.	G4609G11
GE BWR/4-6 10 X 10 GE-12	GE-manufactured fuel for GE BWR/4-6 reactors; 10 X 10 fuel rod array; corresponding lower linear heat generation rate, part-length fuel rods, low pressure drop spacer; no weight available.	G4610G12

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
GE BWR/4-6 Assembly Class (Continued) (Reactor Type: BWR / Length: 176.2 in. / Width: 5.44 in.)		
GE BWR/4-6 9 X 9 GE-13	GE-manufactured fuel for GE BWR/4-6 reactors; 9 X 9 fuel rod array; ferrule spacer, increased bundle weight relative to GE-11 fuel, choice of active fuel lengths; offers critical power capability improvements; no weight available.	G4609G13
GE BWR/4-6 8 X 8 ANF	ANF-manufactured fuel for GE BWR/4-6 reactors; 8 X 8 fuel rod array; 1 water rod; ~176 kg U.	G4608A
GE BWR/4-6 8 X 8 ANF Prepres.	ANF-manufactured fuel for GE BWR/4-6 reactors; 8 X 8 fuel rod array; 1 water rod; prepressurized fuel rods; ~176 kg U.	G4608AP
GE BWR/4-6 9 X 9 ANF	ANF-manufactured fuel for GE BWR/4-6 reactors; 9 X 9 fuel rod array; 2 water rods; ~173 kg U.	G4609A
GE BWR/4-6 9 X 9 ANF 9-5	ANF-manufactured fuel for GE BWR/4-6 reactors; 5 water rods per assembly; estimated 168 kg U.	G4609A5
GE BWR/4-6 9 X 9 ANF 9X	ANF-manufactured fuel for GE BWR/4-6 reactors; central water channel spans 9 fuel rod positions; estimated 168 kg U.	G4609A9X
GE BWR/4-6 9 X 9 ANF IX	ANF-manufactured fuel for GE BWR/4-6 reactors; central water channel spans 9 fuel rod positions; regular fuel rods utilize an internal cladding liner of pure zirconium; estimated 168 kg U.	G4609AIX
GE BWR/4-6 9 X 9 ANF IX+	ANF-manufactured fuel for GE BWR/4-6 reactors; central water channel spans 9 fuel rod positions; high-performance thermal spacers; estimated 168 kg U.	G4609AX+
GE BWR/4-6 10 X 10 ANF ATRIUM	ANF-manufactured fuel for GE BWR/4-6 reactors; central water channel spans 9 fuel rod positions; ULTRAFLOW spacers; 8 part-length fuel rods; mechanical loads are transmitted via internal water channel rather than via tie rods; ~ 181 kg U.	G4610A
GE BWR/4-6 8 X 8 WE	WE-manufactured fuel for GE BWR/4-6 reactors; "QUAD + fuel"; lead test assembly use only; licensed version of ABB Atom water cross fuel; ~174 kg U.	G4608W
GE BWR/4-6 10 X 10 ABB	ABB Atom-manufactured fuel for GE BWR/4-6 reactors; fuel has four 5 X 5 minibundles, each with 24 fuel rods; fuel bundles separated by water cross and centralized water channel; estimated 176 kg U.	G4610C
WE 14 X 14 Assembly Class (Reactor Type: PWR / Length: 159.8 in. / Width: 7.76 in.)		
WE 14 X 14 WE Standard	WE-manufactured fuel for WE 14 X 14 reactors; zircaloy cladding; stainless steel guide tubes; ~394 kg U.	W1414W

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
WE 14 X 14 Assembly Class (Continued) (Reactor Type: PWR / Length: 159.8 in. / Width: 7.76 in.)		
WE 14 X 14 WE LOPAR	WE-manufactured fuel for WE 14 X 14 reactors; low parasitic (LOPAR) fuel; zircaloy guide tubes; Inconel spacer grids; often referred to as "Standard" fuel; ~399 kg U.	W1414WL
WE 14 X 14 WE OFA	WE-manufactured fuel for WE 14 X 14 reactors; Optimized Fuel Assembly; zircaloy spacer grids; smaller fuel rod diameter; ~358 kg U.	W1414WO
WE 14 X 14 ANF	ANF-manufactured fuel for WE 14 X 14 reactors; shorter, larger diameter fuel rod than WE 14 X 14 ANF Top Rod fuel; ~377 kg U.	W1414A
WE 14 X 14 ANF Top Rod	ANF-manufactured fuel for WE 14 X 14 reactors; longer, smaller diameter fuel rod than WE 14 X 14 ANF fuel; ~361 kg U.	W1414ATR
WE 14 X 14 B&W	B&W-manufactured fuel for WE 14 X 14 reactors; only 2 lead test assemblies used at Ginna; ~383 kg U.	W1414B
WE 15 X 15 Assembly Class (Reactor Type: PWR / Length: 159.8 in. / Width: 8.44 in.)		
WE 15 X 15 WE Standard	WE-manufactured fuel for WE 15 X 15 reactors; zircaloy cladding; stainless steel guide tubes; ~454 kg U.	W1515W
WE 15 X 15 WE LOPAR	WE-manufactured fuel for WE 15 X 15 reactors; low parasitic (LOPAR) fuel; zircaloy guide tubes; Inconel spacer grids; often referred to as "Standard" fuel; ~455 kg U.	W1515WL
WE 15 X 15 WE OFA	WE-manufactured fuel for WE 15 X 15 reactors; Optimized Fuel Assembly; zircaloy spacer grids; ~460 kg U.	W1515WO
WE 15 X 15 WE Vantage 5	WE-manufactured fuel for WE 15 X 15 reactors; integral zirconium dioboride neutron absorbers in fuel; natural uranium axial blankets, intermediated flow mixers, removable top nozzle, increased discharged burnup; other Optimized Fuel Assembly features; ~461 kg U.	W1515WV5
WE 15 X 15 ANF	ANF-manufactured fuel for WE 15 X 15 reactors; ~429 kg U.	W1515A
WE 15 X 15 ANF Part Length	ANF-manufactured fuel for WE 15 X 15 reactors; bottom 42 inches of fuel rods replaced by inserts made from stainless steel 304; assemblies placed in positions on the core periphery to provide shielding for core support structure; estimated 305 kg U.	W1515APL
WE 15 X 15 B&W Mark BW	B&W-manufactured fuel for WE 15 X 15 reactors; no weight available.	W1515B

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
WE 17 X 17 Assembly Class (Reactor Type: PWR / Length: 159.8 in. / Width: 8.44 in.)		
WE 17 X 17 WE LOPAR	WE-manufactured fuel for WE 17 X 17 reactors; low parasitic (LOPAR) fuel; zircaloy guide tubes; Inconel spacer grids; often referred to as "Standard" fuel; ~460 kg U.	W1717WL
WE 17 X 17 WE OFA	WE-manufactured fuel for WE 17 X 17 reactors; Optimized Fuel Assembly; zircaloy spacer grids; ~425 kg U.	W1717WO
WE 17 X 17 WE Vantage 5	WE-manufactured fuel for WE 17 X 17 reactors; integral zirconium dioboride neutron absorbers in fuel; natural uranium axial blankets, intermediated flow mixers, removable top nozzle, increased discharged burnup; other Optimized Fuel Assembly features; ~426 kg U.	W1717WV5
WE 17 X 17 WE Vantage +	WE-manufactured fuel for WE 17 X 17 reactors; combines a new cladding material - ZIRLO (a zirconium-niobium alloy) with the advanced neutronic characteristics of Vantage 5 fuel; estimated 426 kg U.	W1717WV+
WE 17 X 17 WE Vantage 5H	WE-manufactured fuel for WE 17 X 17 reactors; hybrid fuel combining the advanced neutronic characteristics of Vantage 5 fuel with the larger fuel rod diameter associated with low parasitic (LOPAR) fuel; ~464 kg U.	W1717WVH
WE 17 X 17 WE Vantage 5H+	WE-manufactured fuel for WE 17 X 17 reactors; Vantage 5 hybrid features; ZIRLO cladding; ~464 kg U.	W1717WVJ
WE 17 X 17 ANF	ANF-manufactured fuel for WE 17 X 17 reactors; ~402 kg U.	W1717A
WE 17 X 17 ANF SPC Design	ANF-manufactured fuel for WE 17 X 17 reactors; uses a larger (0.376 in.) fuel rod diameter than W1717A fuel; zircaloy intermediate flow mixers; ~455 kg U.	W1717AB
WE 17 X 17 B&W Mark BW	B&W-manufactured fuel for WE 17 X 17 reactors; ~455 kg U.	W1717B
South Texas Assembly Class (Reactor Type: PWR / Length: 199 in. / Width: 8.43 in.)		
South Texas 17 X 17 WE	WE-manufactured fuel for use at South Texas reactors; initial core fuel; ~542 kg U.	WST17W
Big Rock Point Assembly Class (Reactor Type: BWR / Length: 84 in. / Width: 6.52 in.)		
Big Rock Point 12 X 12 GE	GE-manufactured fuel for use at Big Rock Point; stainless steel clad fuel; all assemblies reprocessed at West Valley.	XBR12G

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
Big Rock Point Assembly Class (Continued) (Reactor Type: BWR / Length: 84 in. / Width: 6.52 in.)		
Big Rock Point 11 X 11 GE	GE-manufactured fuel for use at Big Rock Point; zircaloy cladding; generic designation which encompasses "B," "C," "D1," and "D2" assembly types; most assemblies reprocessed at West Valley; ~124 kg U.	XBR11G
Big Rock Point 7 X 7 GE	GE-manufactured fuel for use at Big Rock Point developmental center-melt fuel; lead test assembly use only; ~131 kg U.	XBR07G
Big Rock Point 8 X 8 GE	GE-manufactured fuel for use at Big Rock Point developmental center-melt fuel; lead test assembly use only; ~112 kg U.	XBR08G
Big Rock Point 9 X 9 GE	GE-manufactured fuel for use at Big Rock Point; zircaloy cladding; generic designation which encompasses "E," "EG," "F," "MEG," and "PEG" assembly types; ~137 kg U.	XBR09G
Big Rock Point 9 X 9 ANF	ANF-manufactured fuel for use at Big Rock Point; lead test assembly use only; ~127 kg U.	XBR09A
Big Rock Point 11 X 11 ANF	ANF-manufactured fuel for use at Big Rock Point; ~128 kg U.	XBR11A
Big Rock Point 11 X 11 NFS	NFS-manufactured fuel for use at Big Rock Point; lead test assembly use only; ~129 kg U.	XBR11N
Dresden 1 Assembly Class (Reactor Type: BWR / Length: 134.4 in. / Width: 4.28 in.)		
Dresden 1 6 X 6 GE Type 1	GE-manufactured fuel for use at Dresden 1; all but one assembly reprocessed at West Valley; ~111 kg U.	XDR06G
Dresden 1 7 X 7 GE	GE-manufactured fuel for use at Dresden 1; stainless steel clad fuel; 9 thorium oxide corner rods; all reprocessed at West Valley except for the corner rods, which were shipped to the Savannah River Site.	XDR07G
Dresden 1 6 X 6 GE Type III-B	GE-manufactured fuel for use at Dresden 1; erbium oxide as burnable absorber in all 36 fuel rods; some assemblies reprocessed at West Valley; ~102 kg U.	XDR06G3B
Dresden 1 6 X 6 GE Type III-F	GE-manufactured fuel for use at Dresden 1; gadolinium oxide as a burnable absorber in a single, nonfueled rod; some assemblies reprocessed at West Valley; ~102 kg U.	XDR06G3F
Dresden 1 6 X 6 GE Type V	GE-manufactured fuel for use at Dresden 1; gadolinium oxide as a burnable absorber in selected fuel rods; ~106 kg U.	XDR06G5
Dresden 1 7 X 7 GE SA-1	GE-manufactured fuel for use at Dresden 1; a single prototype fuel assembly manufactured and owned by GE.	XDR07GS

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
Dresden 1 Assembly Class (Continued) (Reactor Type: BWR / Length: 134.4 in. / Width: 4.28 in.)		
Dresden 1 8 X 8 GE PF Fuels	GE-manufactured fuel for use at Dresden 1; prototype fuel assemblies with 6 X 6, 7 X 7, and 8 X 8 fuel rod arrays; all have been reprocessed except for one 8 X 8 assembly; ~100 kg U.	XDR08G
Dresden 1 6 X 6 UNC	UNC-manufactured fuel for use at Dresden 1; ~102 kg U.	XDR06U
Dresden 1 6 X 6 ANF	ANF-manufactured fuel for use at Dresden 1; ~95 kg U.	XDR06A
Fort Calhoun Assembly Class (Reactor Type: PWR / Length: 146 in. / Width: 8.1 in.)		
Fort Calhoun 14 X 14 CE	CE-manufactured fuel for use at Fort Calhoun; similar to CE 14 X 14 class fuels except for shorter length; ~366 kg U.	XFC14C
Fort Calhoun 14 X 14 ANF	ANF-manufactured fuel for use at Fort Calhoun; similar to CE 14 X 14 class fuels except for shorter length; ~353 kg U.	XFC14A
Fort Calhoun 14 X 14 WE	WE-manufactured fuel for use at Fort Calhoun; similar to CE 14 X 14 class fuels except for shorter length; ~374 kg U.	XFC14W
Humboldt Bay Assembly Class (Reactor Type: BWR / Length: 95 in. / Width: 4.67 in.)		
Humboldt Bay 7 X 7 GE Type I	GE-manufactured fuel for use at Humboldt Bay; stainless steel clad fuel; all assemblies reprocessed at West Valley; ~80 kg U.	XHB07G
Humboldt Bay 7 X 7 GE Type II	GE-manufactured fuel for use at Humboldt Bay; zircaloy cladding; some assemblies reprocessed at West Valley; ~76 kg U.	XHB07G2
Humboldt Bay 6 X 6 GE	GE-manufactured fuel for use at Humboldt Bay; zircaloy cladding; ~76 kg U.	XHB06G
Humboldt Bay 6 X 6 ANF	ANF-manufactured fuel for use at Humboldt Bay; zircaloy cladding; ~70 kg U.	XHB06A
Haddam Neck Assembly Class (Reactor Type: PWR / Length: 137.1 in. / Width: 8.42 in.)		
Haddam Neck 15 X 15 WE	WE-manufactured fuel for use at Haddam Neck; stainless steel clad; ~416 kg U.	XHN15W
Haddam Neck 15 X 15 NUMEC SS	NU-manufactured fuel for use at Haddam Neck; stainless steel clad; lead test assembly use only; ~406 kg U.	XHN15MS
Haddam Neck 15 X 15 NUMEC Zr	NU-manufactured fuel for use at Haddam Neck; zircaloy clad; lead test assembly use only; ~371 kg U.	XHN15MZ

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
Haddam Neck Assembly Class (Continued) (Reactor Type: PWR / Length: 137.1 in. / Width: 8.42 in.)		
Haddam Neck 15 X 15 GULF SS	GULF-manufactured fuel for use at Haddam Neck; stainless steel clad; lead test assembly use only; ~406 kg U.	XHN15HS
Haddam Neck 15 X 15 GULF Zr	GULF-manufactured fuel for use at Haddam Neck; zircaloy clad; lead test assembly use only; ~363 kg U.	XHN15HZ
Haddam Neck 15 X 15 B&W SS	B&W-manufactured fuel for use at Haddam Neck; stainless steel clad; ~412 kg U.	XHN15B
Haddam Neck 15 X 15 B&W Zr	B&W-manufactured fuel for use at Haddam Neck; zircaloy clad; ~364 kg U.	XHN15BZ
Indian Point 1 Assembly Class (Reactor Type: PWR / Length: 138.8 in. / Width: 6.27 in.)		
Indian Point 1 14 X 15 B&W	B&W-manufactured fuel for use at Indian Point 1; a thorium/uranium oxide fuel pellet; stainless steel clad; assemblies were used with the initial core configuration and were not the same assembly dimensions as later fuels; all assemblies reprocessed at West Valley; ~152 kg U, thorium/uranium.	XIP14B
Indian Point 1 13 X 14 WE	WE-manufactured fuel for use at Indian Point 1; stainless steel clad; dimensions are as specified above for Indian Point 1 assembly class; some assemblies reprocessed at West Valley; ~191 kg U.	XIP14W
LaCrosse Assembly Class (Reactor Type: BWR / Length: 102.5 in. / Width: 5.62 in.)		
LaCrosse 10 X 10 AC	AC-manufactured fuel for use at LaCrosse; stainless steel cladding; ~120 kg U.	XLC10L
LaCrosse 10 X 10 ANF	ANF-manufactured fuel for use at LaCrosse; stainless steel cladding; ~109 kg U.	XLC10A
Palisades Assembly Class (Reactor Type: PWR / Length: 147.5 in. / Width: 8.2 in.)		
Palisades 15 X 15 CE	CE-manufactured fuel for use at Palisades; ~412 kg U.	XPA15C
Palisades 15 X 15 ANF	ANF-manufactured fuel for use at Palisades; ~391 kg U.	XPA15A
St. Lucie 2 Assembly Class (Reactor Type: PWR / Length: 158.2 in. / Width: 8.1 in.)		
St. Lucie 2 16 X 16 CE	CE-manufactured fuel for use at St. Lucie 2; ~377 kg U.	XSL16C

San Onofre 1 Assembly Class
 (Reactor Type: PWR / Length: 137.1 in. / Width: 7.76 in.)

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
San Onofre 1 14 X 14 WE	WE-manufactured fuel for use at San Onofre 1; stainless steel clad; ~366 kg U.	XSO14W
San Onofre 1 14 X 14 WE Zr	WE-manufactured fuel for use at San Onofre 1; zircaloy clad demonstration fuel; no weight available.	XSO14WZ
<p style="text-align: center;">Yankee Rowe Assembly Class (Reactor Type: PWR / Length: 111.8 in. / Width: 7.62 in.)</p>		
Yankee Rowe 17 X 18 WE	WE-manufactured fuel for use at Yankee Rowe; stainless steel clad; nonsquare array designed to allow space for cruciform control blades; most assemblies reprocessed at West Valley; ~273 kg U.	XYR18W
Yankee Rowe 15 X 16 UNC	UNC-manufactured fuel for use at Yankee Rowe; nonsquare array designed to allow space for cruciform control blades; ~239 kg U.	XYR16U
Yankee Rowe 15 X 16 ANF	ANF-manufactured fuel for use at Yankee Rowe; nonsquare array designed to allow space for cruciform control blades; ~234 kg U.	XYR16A
Yankee Rowe 15 X 16 CE	CE-manufactured fuel for use at Yankee Rowe; nonsquare array designed to allow space for cruciform control blades; ~229 kg U.	XYR16C

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table B5. Assembly Characteristics by Assembly Type

Assemblies							Rods		
Assembly Type Code	Current Fabricator	Cladding	Avg. Initial Loading Weight of Uranium (kg)	Width as Built (inches)	Length as Built (inches)	Number Discharged	Length (inches)	Number of Positions	Number of Fuel Rods
Boiling-Water Reactors (BWR)									
G2307G2A	GE	ZR	195	5.44	171.2	1,672	158.9	49	49
G2307G2B	GE	ZR	193	5.44	171.2	5,047	158.9	49	49
G2307G3	GE	ZR	188	5.44	171.2	394	158.9	49	49
G2308G4	GE	ZR	184	5.44	171.2	3,876	158.9	64	63
G2308G5	GE	ZR	177	5.44	171.2	879	158.9	64	62
G2308GP	GE	ZR	177	5.44	171.2	2,832	158.9	64	62
G2308GB	GE	ZR	177	5.44	171.2	1,376	158.9	64	62
G2308G8A	GE	ZR	177	5.44	171.2	312	158.9	64	62
G2308G8B	GE	ZR	172	5.44	171.2	360	158.9	64	60
G2308G9	GE	ZR	172	5.44	171.2	--	158.9	64	60
G2308G10	GE	ZR	^a 172	5.44	172.0	188	158.9	64	60
G2309G11	GE	ZR	170	5.44	171.2	--	^b 158.9	81	74
G2310G12	GE	ZR	--	5.44	171.2	--	^b 158.9	100	NA
G2309G13	GE	ZR	--	5.44	171.2	--	158.9	81	NA
G2307A	SIEM	ZR	182	5.44	171.2	260	158.9	49	48
G2308A	SIEM	ZR	^a 175	5.44	171.2	1,409	158.9	64	63
G2308AP	SIEM	ZR	175	5.44	171.2	32	158.9	64	63
G2309A	SIEM	ZR	168	5.44	171.2	176	158.9	81	79
G2309A5	SIEM	ZR	^a 161	5.44	171.2	--	158.9	81	76
G2309A9X	SIEM	ZR	^a 153	5.44	171.2	--	158.9	81	72
G2309AIX	SIEM	ZR	^a 153	5.44	171.2	--	158.9	81	72
G4607G2	GE	ZR	195	5.44	176.2	1,142	163.8	49	49
G4607G3A	GE	ZR	187	5.44	176.2	3,752	163.8	49	49
G4607G3B	GE	ZR	190	5.44	176.2	1,184	163.8	49	49
G4608G4A	GE	ZR	184	5.44	176.2	1,785	163.8	64	63
G4608G4B	GE	ZR	187	5.44	176.2	1,787	163.8	64	63
G4608G5	GE	ZR	183	5.44	176.2	4,380	163.8	64	62
G4608GP	GE	ZR	183	5.44	176.2	11,625	163.8	64	62
G4608GB	GE	ZR	185	5.44	176.2	8,575	163.8	64	62
G4608G8	GE	ZR	179	5.44	176.2	1,886	163.8	64	60
G4608G9	GE	ZR	172	5.44	176.2	242	163.8	64	60
G4608G10	GE	ZR	^a 177	5.44	176.2	5	163.8	64	60
G4609G11	GE	ZR	^a 170	5.44	176.2	40	^b 163.8	81	74
G4610G12	GE	ZR	--	5.44	176.2	--	^b 163.8	100	NA

See footnotes at end of table.

Table B5. Assembly Characteristics by Assembly Type (Continued)

Assemblies							Rods		
Assembly Type Code	Current Fabricator	Cladding	Avg. Initial Loading Weight of Uranium (kg)	Width as Built (inches)	Length as Built (inches)	Number Discharged	Length (inches)	Number of Positions	Number of Fuel Rods
Boiling-Water Reactors (BWR)									
G4609G13	GE	ZR	172	5.44	176.2	--	163.8	81	NA
G4608A	SIEM	ZR	176	5.44	176.2	1,336	163.8	64	62
G4608AP	SIEM	ZR	176	5.44	176.2	404	163.8	64	62
G4609A	SIEM	ZR	173	5.44	176.2	1,108	163.8	81	79
G4609A5	SIEM	ZR	^a 168	5.44	176.2	36	163.8	81	76
G4609A9X	SIEM	ZR	^a 168	5.44	176.2	--	163.8	81	72
G4609AIX	SIEM	ZR	^a 168	5.44	176.2	4	163.8	81	72
G4609AX+	SIEM	ZR	^a 168	5.44	176.2	--	163.8	81	72
G4610A	SIEM	ZR	181	5.44	176.2	--	^b 163.8	100	91
G4608W	WE	ZR	174	5.44	176.2	4	163.8	64	64
G4610C	CE	ZR	^a 176	5.44	176.2	--	163.8	100	96
XBR12G	GE	SS	--	6.52	84.0	--	NA	144	144
XBR11G	GE	ZR	124	6.52	84.0	6	75.0	121	121
XBR07G	GE	ZR	131	6.52	84.0	4	75.0	49	49
XBR08G	GE	ZR	112	6.52	84.0	2	75.0	64	64
XBR09G	GE	ZR	137	6.52	84.0	143	75.0	81	81
XBR09A	SIEM	ZR	127	6.52	84.0	4	75.0	81	81
XBR11A	SIEM	ZR	128	6.52	84.0	254	75.0	121	117
XBR11N	NFS	ZR	129	6.52	84.0	8	75.0	121	121
XDR06G	GE	ZR	111	4.28	134.4	1	117.0	36	36
XDR07G	GE	SS	--	4.28	134.4	--	117.0	49	49
XDR06G3B	GE	ZR	102	4.28	134.4	163	117.0	36	36
XDR06G3F	GE	ZR	102	4.28	134.4	96	117.0	36	35
XDR06G5	GE	ZR	106	4.28	134.4	106	117.0	36	36
XDR07GS	GE	ZR	--	4.28	134.4	1	117.0	49	44
XDR08G	GE	ZR	100	4.28	134.4	1	117.0	64	63
XDR06U	UNC	ZR	102	4.28	134.4	458	117.0	36	36
XDR06A	SIEM	ZR	95	4.28	134.4	66	117.0	36	35
XHB07G	GE	SS	80	4.67	95.0	--	NA	49	49
XHB07G2	GE	ZR	76	4.67	95.0	88	83.2	49	49
XHB06G	GE	ZR	76	4.67	95.0	176	79.0	36	36
XHB06A	SIEM	ZR	70	4.67	95.0	126	79.0	36	36
XLC10L	AC	SS	120	5.62	102.5	155	90.0	100	100
XLC10A	SIEM	SS	109	5.62	102.5	178	90.0	100	96

See footnotes at end of table.

Table B5. Assembly Characteristics by Assembly Type (Continued)

Assemblies							Rods		
Assembly Type Code	Current Fabricator	Cladding	Avg. Initial Loading Weight of Uranium (kg)	Width as Built (inches)	Length as Built (inches)	Number Discharged	Length (inches)	Number of Positions	Number of Fuel Rods
Pressurized-Water Reactors (PWR)									
B1515B2	B&W	ZR	464	8.54	165.7	--	153.7	225	208
B1515B3	B&W	ZR	464	8.54	165.7	1	153.7	225	208
B1515B4	B&W	ZR	464	8.54	165.7	4,134	153.7	225	208
B1515B4Z	B&W	ZR	464	8.54	165.7	89	153.7	225	208
B1515B5	B&W	ZR	464	8.54	165.7	58	153.7	225	208
B1515B5Z	B&W	ZR	464	8.54	165.7	29	153.7	225	208
B1515B6	B&W	ZR	464	8.54	165.7	130	153.7	225	208
B1515B7	B&W	ZR	464	8.54	165.7	96	153.7	225	208
B1515B8	B&W	ZR	464	8.54	165.7	229	153.7	225	208
B1515B9	B&W	ZR	464	8.54	165.7	21	153.7	225	208
B1515B10	B&W	ZR	464	8.54	165.7	--	153.7	225	208
B1515B	B&W	ZR	464	8.54	165.7	--	153.7	225	208
B1515BZ	B&W	ZR	464	8.54	165.7	640	153.7	225	208
B1515BEB	B&W	ZR	464	8.54	165.7	--	153.7	225	208
B1515BGD	B&W	ZR	430	8.54	165.7	4	153.7	225	208
B1515W	WE	ZR	462	8.54	165.7	4	NA	225	208
B1717B	B&W	ZR	456	8.54	165.7	4	152.7	289	264
C1414C	CE	ZR	382	8.10	157.0	3,368	147.0	176	164
C1414A	SIEM	ZR	370	8.10	157.0	761	147.0	176	176
C1414W	WE	ZR	407	8.10	157.0	436	147.0	176	176
C1616CSD	CE	ZR	416	8.10	176.8	2,340	161.0	236	224
C8016C	CE	ZR	413	8.10	178.3	1,132	161.0	236	220
W1414W	WE	ZR	394	7.76	159.8	622	152.4	196	179
W1414WL	WE	ZR	399	7.76	159.8	1,410	152.4	196	179
W1414WO	WE	ZR	358	7.76	159.8	965	152.4	196	179
W1414A	SIEM	ZR	377	7.76	159.8	806	152.4	196	179
W1414ATR	SIEM	ZR	361	7.76	159.8	288	152.4	196	179
W1414B	B&W	ZR	383	7.76	159.8	2	152.4	196	179
W1515W	WE	ZR	454	8.44	159.8	1,580	152.0	225	204
W1515WL	WE	ZR	455	8.44	159.8	3,481	152.0	225	204
W1515WO	WE	ZR	460	8.44	159.8	1,533	152.0	225	204
W1515WV5	WE	ZR	461	8.44	159.8	--	152.0	225	204
W1515A	SIEM	ZR	429	8.44	159.8	884	152.0	225	204
W1515APL	SIEM	ZR	^a 305	8.44	159.8	12	NA	225	204
W1515B	B&W	ZR	--	8.44	159.8	--	NA	225	204
W1717WL	WE	ZR	460	8.44	159.8	9,525	152.0	289	264
W1717WO	WE	ZR	425	8.44	159.8	2,969	155.0	289	264
W1717WV5	WE	ZR	426	8.44	159.8	1,296	152.0	289	264
W1717WV+	WE	ZIRLO	^a 426	8.44	159.8	35	NA	289	260

See footnotes at end of table.

Table B5. Assembly Characteristics by Assembly Type (Continued)

Assemblies							Rods		
Assembly Type Code	Current Fabricator	Cladding	Avg. Initial Loading Weight of Uranium (kg)	Width as Built (inches)	Length as Built (inches)	Number Discharged	Length (inches)	Number of Positions	Number of Fuel Rods
Pressurized-Water Reactors (PWR)									
W1717WVH	WE	ZR	464	8.44	159.8	587	NA	289	264
W1717WVJ	WE	ZIRLO	464	8.44	159.8	--	NA	289	264
W1717A	SIEM	ZR	402	8.44	159.8	332	152.0	289	264
W1717AB	SIEM	ZR	455	8.44	159.8	--	152.0	289	264
W1717B	B&W	ZR	455	8.44	159.8	130	152.0	289	264
WST17W	WE	ZR	542	8.43	199.0	421	176.6	289	264
XFC14C	CE	ZR	366	8.10	146.0	378	137.0	176	168
XFC14A	SIEM	ZR	353	8.10	146.0	192	137.0	176	176
XFC14W	WE	ZR	374	8.10	146.0	--	NA	176	176
XHN15W	WE	SS	416	8.42	137.1	309	126.7	225	204
XHN15MS	NU	SS	406	8.42	137.1	2	126.7	225	204
XHN15MZ	NU	ZR	371	8.42	137.1	2	126.7	225	204
XHN15HS	GA	SS	406	8.42	137.1	1	126.7	225	204
XHN15HZ	GA	ZR	363	8.42	137.1	2	126.7	225	204
XHN15B	B&W	SS	412	8.42	137.1	576	126.7	225	204
XHN15BZ	B&W	ZR	364	8.42	137.1	--	126.7	225	208
XIP14B	B&W	SS	^a 152	6.14	135.7	--	99.0	206	206
XIP14W	WE	SS	191	6.27	138.8	160	126.7	196	180
XPA15C	CE	ZR	412	8.20	147.5	273	139.4	225	204
XPA15A	SIEM	ZR	391	8.20	147.5	520	139.4	225	216
XSL16C	CE	ZR	377	8.10	158.2	544	146.5	236	224
XSO14W	WE	SS	366	7.76	137.1	665	126.7	196	180
XSO14WZ	WE	ZR	--	7.76	137.1	--	126.7	196	179
XYR18W	WE	SS	273	7.62	111.8	76	95.0	305	305
XYR16U	UNC	ZR	239	7.62	111.8	73	95.0	240	231
XYR16A	SIEM	ZR	234	7.62	111.8	228	95.0	240	231
XYR16C	CE	ZR	229	7.62	111.8	156	95.0	240	231

^aEstimated weight based on most current data.^bPart-length fuel rods.^cAverage initial loading weight of thorium/uranium (kg).

-- = Not applicable; NA = Not available.

Note: There are 87 temporarily discharged PWR assemblies that have not been assigned an assembly type code. These assemblies are not included in the above table. See Technical Note 10 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table B6. Assembly Type Summary by Reactor

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
Arkansas Nuclear 1	B1515B4	624	289.1	30.8	2.97
	B1515BZ	60	27.8	38.2	3.45
Subtotal Arkansas Nuclear 1		684	316.9		
Arkansas Nuclear 2	C1616CSD	636	263.9	35.8	3.33
Beaver Valley 1	W1717WL	454	209.0	29.9	2.99
	W1717WO	2	0.8	35.8	3.20
	W1717WVH	120	55.7	35.4	3.56
Subtotal Beaver Valley 1		576	265.6		
Beaver Valley 2	W1717WL	156	71.8	26.5	2.60
	W1717WVH	104	48.2	37.4	3.54
Subtotal Beaver Valley 2		260	120.0		
Big Rock Point	XBR11G	6	0.7	19.8	3.63
	XBR07G	4	0.5	1.5	3.63
	XBR08G	2	0.2	4.1	3.63
	XBR09G	143	19.6	14.5	3.59
	XBR09A	4	0.5	20.9	3.48
	XBR11A	254	32.9	24.6	3.42
	XBR11N	8	1.0	18.9	2.86
Subtotal Big Rock Point		421	55.6		
Braidwood 1	W1717WO	260	110.6	30.6	2.90
	W1717WV5	64	27.2	38.9	3.78
Subtotal Braidwood 1		324	137.8		
Braidwood 2	W1717WO	193	81.6	27.7	2.60
	W1717WV5	151	64.2	38.0	3.82
Subtotal Braidwood 2		344	145.8		
Browns Ferry 1	G4607G2	168	32.9	10.4	1.11
	G4607G3A	596	111.8	24.0	2.50
	G4608G4A	168	30.9	26.5	2.73
	G4608G5	156	28.6	28.1	2.66
	G4608GP	492	89.9	23.7	2.84
Subtotal Browns Ferry 1		1,580	294.0		
Browns Ferry 2	G4607G2	168	32.9	9.8	1.10
	G4607G3A	596	111.5	23.0	2.51
	G4608G4A	168	30.9	28.2	2.73
	G4608G5	232	42.3	28.9	2.87
	G4608GP	736	134.6	23.9	2.79
	G4608G9	80	14.2	0.0	3.25
Subtotal Browns Ferry 2		1,980	366.4		
Browns Ferry 3	G4608G4B	764	142.8	20.7	2.20
	G4608G5	208	38.1	28.0	2.65
	G4608GP	58	10.6	25.5	2.66
Subtotal Browns Ferry 3		1,030	191.4		
Brunswick 1	G4608G4B	560	104.4	18.3	2.11
	G4608G5	360	65.9	28.9	2.78
	G4608GP	153	28.0	29.4	2.84
	G4608GB	267	49.3	33.0	2.99
Subtotal Brunswick 1		1,340	247.6		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
Brunswick 2	G4607G3A	564	105.7	16.6	1.90
	G4608G4B	140	26.2	24.8	2.74
	G4608G5	300	55.0	26.4	2.83
	G4608GP	247	45.2	26.6	2.68
	G4608GB	208	38.4	33.3	2.99
	G4608G8	92	16.4	34.2	3.22
	G4608G9	1	0.2	18.0	3.29
Subtotal Brunswick 2		1,552	287.0		
Byron 1	W1717WO	357	151.3	32.3	3.01
	W1717WV5	163	69.2	38.8	3.79
Subtotal Byron 1		520	220.5		
Byron 2	W1717WO	281	119.6	32.6	2.88
	W1717WV5	63	26.7	36.4	3.66
Subtotal Byron 2		344	146.3		
Callaway	W1717WL	193	89.0	24.4	2.60
	W1717WO	84	35.9	39.7	3.61
	W1717WV5	271	115.2	40.2	3.97
Subtotal Callaway		548	240.1		
Calvert Cliffs 1	C1414C	888	340.5	33.0	3.19
Calvert Cliffs 2	C1414C	700	268.0	34.0	3.20
Catawba 1	W1717WO	448	190.1	31.1	2.92
	W1717B	36	16.4	33.0	3.56
Subtotal Catawba 1		484	206.6		
Catawba 2	W1717WO	444	188.5	32.0	3.02
Clinton 1	G4608GP	624	114.6	16.5	1.71
	G4608GB	100	18.6	28.4	2.84
Subtotal Clinton 1		724	133.2		
Comanche Peak 1	W1717WL	205	94.2	23.5	2.42
Comanche Peak 2	W1717WO	88	37.6	14.5	1.82
Cook 1	W1515WL	193	87.5	27.5	2.78
	W1515WO	367	169.0	37.6	3.43
	W1515A	386	165.0	31.5	2.91
Subtotal Cook 1		946	421.5		
Cook 2	W1717WL	365	167.6	28.8	2.98
	W1717WV5	36	15.3	39.1	3.66
	W1717A	332	133.5	40.1	3.80
Subtotal Cook 2		733	316.4		
Cooper Station	G4607G2	128	25.1	10.1	1.09
	G4607G3B	420	79.8	25.2	2.51
	G4608G4A	72	13.2	25.0	2.51
	G4608G4B	136	25.4	30.5	2.73
	G4608G5	192	35.1	30.8	2.82
	G4608GP	636	116.5	29.6	2.75
	G4608GB	272	50.4	30.2	2.79
	G4608G10	4	0.7	29.0	2.64
Subtotal Cooper Station		1,860	346.3		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Average Enrichment (weight percent)
Crystal River 3	B1515B3	1	0.5	23.0	1.93
	B1515B4	496	230.3	26.7	2.77
	B1515B4Z	71	32.9	40.0	3.90
	B1515BZ	40	18.5	38.0	3.85
	Subtotal Crystal River 3	608	282.2		
Davis-Besse	B1515B4	385	181.0	30.0	2.82
	B1515B5	58	27.2	38.0	3.13
	B1515B8	75	35.1	39.7	3.47
	^b Temps	2	0.9		
	Subtotal Davis-Besse	520	244.2		
Diablo Canyon 1	W1717WL	337	155.4	33.5	3.06
	W1717WV5	127	54.0	41.3	4.13
	Subtotal Diablo Canyon 1	464	209.4		
Diablo Canyon 2	W1717WL	337	155.2	31.0	2.97
	W1717WV5	147	62.5	44.2	4.20
	Subtotal Diablo Canyon 2	484	217.7		
Dresden 1	XDR06G	1	0.1	21.3	1.47
	XDR06G3B	163	16.6	16.9	1.83
	XDR06G3F	96	9.8	20.0	2.25
	XDR06G5	106	11.2	19.0	2.26
	XDR07GS	1	0.1	29.0	3.10
	XDR08G	1	0.1	23.3	1.95
	XDR06U	458	46.7	16.1	2.24
	XDR06A	66	6.3	4.5	2.23
	Subtotal Dresden 1	892	90.9		
Dresden 2	G2307G2B	1,477	284.3	10.4	2.08
	G2307G3	32	6.0	23.7	2.29
	G2308G4	476	87.8	25.1	2.52
	G2308G5	160	28.3	28.7	2.67
	G2308GP	228	40.4	28.4	2.64
	G2308A	412	71.3	31.8	2.82
	G2309A	28	4.7	35.4	3.08
	Subtotal Dresden 2	2,813	522.8		
Dresden 3	G2307G2B	724	140.2	17.3	2.13
	G2307G3	52	9.8	24.0	2.30
	G2308G4	508	93.4	25.7	2.56
	G2308GP	200	35.4	28.0	2.65
	G2308A	380	66.0	31.9	2.74
	G2308AP	32	5.5	34.0	2.83
	G2309A	148	25.0	36.1	3.13
	Subtotal Dresden 3	2,044	375.3		
Duane Arnold	G4607G3A	372	69.8	15.9	1.90
	G4608G4A	185	34.1	26.3	2.74
	G4608GP	388	71.0	28.6	2.86
	G4608GB	119	21.9	28.0	3.01
	G4608G8	216	38.5	33.9	3.06
	Subtotal Duane Arnold	1,280	235.3		
Enrico Fermi 2	G4608GP	672	121.5	20.6	1.91
	G4608G8	188	33.7	31.0	3.19
	G4609G11	40	6.8	^a 0.0	3.31
	Subtotal Enrico Fermi 2	900	161.9		
Farley 1	W1717WL	714	329.2	32.6	3.25
	W1717WO	2	0.8	46.3	3.11
	Subtotal Farley 1	716	330.1		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Average Enrichment (weight percent)
Farley 2	W1717WL	556	256.6	33.2	3.29
	W1717WV5	2	0.8	22.0	4.20
Subtotal Farley 2		558	257.4		
FitzPatrick	G4607G2	132	25.8	9.1	1.11
	G4607G3A	428	80.2	22.8	2.50
	G4608G4A	132	24.3	26.0	2.74
	G4608G5	136	24.8	26.8	2.78
	G4608GP	549	100.3	27.8	2.90
	G4608GB	196	36.1	29.8	2.99
	G4608G8	310	55.6	33.9	3.26
	G4608G10	1	0.2	25.0	3.24
	G4608W	4	0.6	23.0	3.01
Subtotal FitzPatrick		1,888	348.0		
Fort Calhoun	XFC14C	378	137.2	30.2	2.87
	XFC14A	192	67.8	37.3	3.57
Subtotal Fort Calhoun		570	205.0		
Ginna	W1414W	362	141.8	24.4	3.03
	W1414WO	203	71.6	40.6	3.59
	W1414A	194	72.3	37.1	3.22
	W1414B	2	0.8	24.4	3.22
Subtotal Ginna		761	286.4		
Grand Gulf 1	G4608GP	800	146.9	15.5	1.72
	G4608A	584	103.0	30.3	2.94
	G4608AP	240	42.2	35.0	3.37
	G4609A5	36	6.4	31.9	3.39
Subtotal Grand Gulf 1		1,660	298.5		
Haddam Neck	XHN15W	309	128.4	27.9	3.58
	XHN15MS	2	0.8	28.3	3.66
	XHN15MZ	2	0.7	25.6	2.95
	XHN15HS	1	0.4	32.2	3.99
	XHN15HZ	2	0.7	18.5	3.26
	XHN15B	576	237.1	33.7	3.99
Subtotal Haddam Neck		892	368.2		
Harris 1	W1717WL	200	92.6	30.1	2.85
	W1717WV5	76	32.3	44.6	3.99
Subtotal Harris 1		276	125.0		
Hatch 1	G4607G3A	560	104.9	20.9	2.33
	G4608G4A	92	16.9	23.1	2.51
	G4608G5	384	70.3	22.9	2.43
	G4608GP	328	60.1	25.2	2.82
	G4608GB	549	101.3	26.0	2.70
	G4608G8	50	9.3	31.9	2.96
	G4608G9	137	24.4	34.9	3.14
	G4609A	4	0.7	34.0	2.79
Subtotal Hatch 1		2,104	387.8		
Hatch 2	G4608G5	509	93.4	19.2	1.97
	G4608GP	407	74.5	25.0	2.74
	G4608GB	891	164.2	27.3	2.84
	G4608G9	4	0.7	16.3	3.14
	G4609A	4	0.7	36.0	2.79
Subtotal Hatch 2		1,815	333.5		
Hope Creek	G4608GP	92	17.0	3.0	0.73
	G4608GB	1,148	212.4	24.5	2.42
Subtotal Hope Creek		1,240	229.5		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
Humboldt Bay	XHB07G2	88	6.7	18.2	2.11
	XHB06G	176	13.4	17.2	2.43
	XHB06A	126	8.8	9.0	2.40
Subtotal Humboldt Bay		390	28.9		
Indian Point 1	XIP14W	160	30.6	16.7	4.11
Indian Point 2	W1515W	393	177.3	29.3	3.00
	W1515WL	332	152.4	36.8	3.37
	W1515WO	24	11.0	34.5	3.63
	^b Temps	7	3.2		
Subtotal Indian Point 2		756	343.9		
Indian Point 3	W1515WL	409	186.8	31.5	3.03
	W1515WO	173	79.9	36.6	3.35
	^b Temps	2	0.9		
Subtotal Indian Point 3		584	267.6		
Kewaunee	W1414W	241	95.7	31.7	3.06
	W1414A	447	169.3	35.3	3.34
Subtotal Kewaunee		688	265.0		
LaCrosse	XLC10L	155	18.6	14.5	3.77
	XLC10A	178	19.3	14.9	3.69
Subtotal LaCrosse		333	38.0		
LaSalle County 1	G4608G5	627	114.9	17.9	1.81
	G4608GP	192	35.1	28.9	2.42
	G4608GB	245	45.3	33.6	3.03
	G4608G8	156	28.8	34.9	3.09
	G4608G9	8	1.4	37.0	3.01
Subtotal LaSalle County 1		1,228	225.5		
LaSalle County 2	G4608G5	764	139.6	19.7	1.89
	G4608GB	224	41.7	33.0	3.00
	G4608G8	144	26.6	31.4	3.12
Subtotal LaSalle County 2		1,132	207.9		
Limerick 1	G4608GP	632	115.9	2.2	1.67
	G4608GB	990	182.9	18.8	2.32
	G4608G8	216	38.4	38.8	3.21
Subtotal Limerick 1		1,838	337.3		
Limerick 2	G4608GB	654	121.6	17.2	1.71
Maine Yankee	C1414C	922	349.0	27.0	2.73
	C1414A	223	82.5	36.9	3.20
	^b Temps	4	1.5		
Subtotal Maine Yankee		1,149	433.0		
McGuire 1	W1717WL	193	88.7	27.5	2.60
	W1717WO	404	171.6	36.6	3.44
	W1717B	19	8.5	34.8	3.58
Subtotal McGuire 1		616	268.8		
McGuire 2	W1717WL	193	88.8	26.1	2.58
	W1717WO	404	171.7	36.8	3.35
	W1717B	31	14.1	37.0	3.95
Subtotal McGuire 2		628	274.7		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
Millstone 1	G2307G2A	580	113.4	16.8	2.08
	G2307G2B	82	15.9	21.0	2.30
	G2307G3	154	28.9	24.1	2.45
	G2308G4	392	72.2	26.9	2.69
	G2308G5	148	26.2	26.4	2.66
	G2308GP	360	63.8	27.9	2.79
	G2308GB	212	37.7	27.8	3.00
	G2308G8A	188	33.5	32.0	2.98
	G2308G10	188	33.3	34.0	3.36
Subtotal Millstone 1		2,304	424.8		
Millstone 2	C1414C	361	138.9	28.6	2.61
	C1414A	71	26.4	37.1	3.33
	C1414W	436	177.6	32.9	3.05
Subtotal Millstone 2		868	342.9		
Millstone 3	W1717WL	332	152.8	33.3	3.25
Monticello	G2307G2B	484	93.7	15.5	2.25
	G2307G3	20	3.7	23.8	2.30
	G2308G4	596	109.7	24.6	2.41
	G2308G5	112	19.8	30.8	2.74
	G2308GP	404	71.6	32.2	2.72
	G2308G8A	124	22.2	34.2	2.98
	G2308G8B	140	24.2	39.0	3.18
Subtotal Monticello		1,880	345.0		
Nine Mile Point 1	G2307G2A	532	103.2	16.2	2.11
	G2307G2B	96	18.6	20.1	2.42
	G2307G3	108	20.2	26.0	2.50
	G2308G4	456	83.9	25.7	2.60
	G2308G5	184	32.5	27.9	2.77
	G2308GP	436	77.2	26.4	2.79
		1,812	335.7		
Nine Mile Point 2	G4608GP	332	61.4	12.5	1.47
	G4608GB	308	56.8	23.5	2.19
Subtotal Nine Mile Point 2		640	118.2		
North Anna 1	W1717WL	574	263.9	33.3	3.34
	W1717WVH	48	22.3	46.7	4.12
Subtotal North Anna 1		622	286.2		
North Anna 2	W1717WL	511	235.1	35.3	3.35
	W1717WVH	55	25.5	40.2	4.10
	^b Temps	1	0.5		
Subtotal North Anna 2		567	261.1		
Oconee 1	B1515B4	569	264.5	26.7	2.75
	B1515B4Z	4	1.9	42.0	3.32
	B1515B6	60	27.7	43.0	3.61
	B1515B8	37	17.2	42.0	3.56
	B1515B9	6	2.8	35.0	3.55
	B1515BZ	206	95.5	37.9	3.33
	B1515BGD	4	1.7	43.0	3.92
Subtotal Oconee 1		886	411.3		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
Oconee 2	B1515B4	568	263.5	29.1	2.89
	B1515B4Z	8	3.7	36.0	3.22
	B1515B5Z	29	13.5	36.0	3.21
	B1515B6	57	26.3	41.7	3.40
	B1515B7	36	16.2	43.0	3.55
	B1515B8	48	22.3	42.8	3.77
	B1515B9	15	6.9	33.0	3.30
	B1515BZ	91	42.2	36.2	3.22
	B1717B	4	1.8	29.5	2.84
Subtotal Oconee 2		856	396.3		
Oconee 3	B1515B4	505	233.9	28.3	2.83
	B1515B6	13	6.0	37.0	3.20
	B1515B7	60	27.8	41.0	3.50
	B1515B8	43	20.0	44.6	3.80
	B1515BZ	187	86.7	34.1	3.24
Subtotal Oconee 3		808	374.3		
Oyster Creek	G2307G2A	560	109.3	17.3	2.11
	G2307G2B	156	30.2	22.7	2.62
	G2308G5	87	15.4	26.0	2.39
	G2308GP	156	27.5	29.2	2.84
	G2308GB	40	7.1	25.6	2.68
	G2308G8B	172	29.6	33.8	3.09
	G2307A	260	47.4	23.5	2.64
	G2308A	617	108.0	25.0	2.50
Subtotal Oyster Creek		2,048	374.4		
Palisades	XPA15C	273	112.6	16.0	2.47
	XPA15A	520	203.9	30.8	2.95
Subtotal Palisades		793	316.5		
Palo Verde 1	C8016C	368	151.7	32.2	3.00
Palo Verde 2	C8016C	384	156.5	31.5	3.03
Palo Verde 3	C8016C	380	156.4	30.5	3.04
Peach Bottom 2	G4607G2	168	32.9	9.5	1.10
	G4607G3A	596	111.7	22.7	2.51
	G4608G4A	360	66.3	25.5	2.74
	G4608G5	260	47.5	29.2	2.86
	G4608GP	552	100.8	28.0	2.89
	G4608GB	292	53.4	31.5	2.99
	G4608G8	208	36.9	35.4	3.20
Subtotal Peach Bottom 2		2,436	449.4		
Peach Bottom 3	G4607G3B	764	145.0	20.1	2.19
	G4608G4B	187	34.9	24.1	2.74
	G4608G5	252	46.1	29.7	2.83
	G4608GP	779	142.1	29.8	2.95
	G4608GB	217	39.9	30.5	2.99
	G4608G8	1	0.2	27.0	3.21
Subtotal Peach Bottom 3		2,200	408.2		
Perry 1	G4608GB	972	177.9	19.3	2.13
Pilgrim 1	G2307G2B	580	111.9	14.9	2.19
	G2308G4	580	106.7	20.7	2.30
	G2308GP	436	77.2	27.4	2.75
	G2308GB	32	5.7	30.0	2.81
Subtotal Pilgrim 1		1,628	301.6		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Average Enrichment (weight percent)
Point Beach 1	W1414W	12	4.8	38.7	3.21
	W1414WL	517	206.0	31.3	3.06
	W1414WO	165	59.2	43.0	3.59
	Subtotal Point Beach 1	694	270.0		
Point Beach 2	W1414W	7	2.8	41.6	3.20
	W1414WL	411	164.1	33.3	3.09
	W1414WO	203	72.8	41.8	3.52
	Subtotal Point Beach 2	621	239.7		
Prairie Island 1	W1414WL	241	95.9	30.6	3.01
	W1414WO	197	70.7	41.3	3.67
	W1414A	89	33.6	37.5	3.44
	W1414ATR	144	52.6	37.8	3.33
	Subtotal Prairie Island 1	671	252.7		
Prairie Island 2	W1414WL	241	96.8	31.7	3.11
	W1414WO	197	70.8	40.2	3.65
	W1414A	76	28.8	37.3	3.45
	W1414ATR	144	51.9	38.6	3.43
	Subtotal Prairie Island 2	658	248.2		
Quad Cities 1	G2307G2B	693	134.0	20.1	2.13
	G2307G3	28	5.2	29.0	2.24
	G2308G4	376	69.2	28.0	2.52
	G2308G5	188	33.3	30.1	2.63
	G2308GP	336	59.5	29.1	2.76
	G2308GB	528	93.5	31.9	2.79
	G2308G8B	48	8.3	36.8	3.00
	Subtotal Quad Cities 1	2,197	403.0		
Quad Cities 2	G2307G2B	755	146.0	19.8	2.14
	G2308G4	492	90.6	28.2	2.55
	G2308GP	276	48.8	29.1	2.66
	G2308GB	564	99.7	32.2	2.77
	Subtotal Quad Cities 2	2,087	385.1		
Rancho Seco	B1515B4	437	202.5	28.2	2.92
	B1515BZ	56	25.9	10.0	3.06
	Subtotal Rancho Seco	493	228.4		
River Bend 1	G4608GB	787	145.7	21.2	2.09
	G4608G8	169	30.1	32.4	3.22
	Subtotal River Bend 1	956	175.9		
Robinson 2	W1515WL	314	141.5	23.7	2.63
	W1515A	498	214.1	34.0	3.05
	W1515APL	12	3.7	22.0	1.21
	Subtotal Robinson 2	824	359.2		
St. Lucie 1	C1414C	497	189.6	28.9	2.81
	C1414A	467	174.1	37.3	3.51
	Subtotal St. Lucie 1	964	363.7		
St. Lucie 2	XSL16C	544	205.9	33.8	3.08
Salem 1	W1717WL	624	287.5	32.8	3.23
	W1717WO	2	0.8	34.7	2.79
	W1717WVH	60	27.9	38.1	3.76
	^b Temps	22	10.2		
	Subtotal Salem 1	708	326.5		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Average Enrichment (weight percent)
Salem 2	W1717WL	477	219.8	32.3	3.25
	W1717WVH	48	22.3	41.5	3.90
	^b Temps	31	14.4		
Subtotal Salem 2		556	256.4		
San Onofre 1	XSO14W	665	244.3	27.3	3.86
San Onofre 2	C1616CSD	592	244.2	32.1	3.26
San Onofre 3	C1616CSD	592	244.1	32.3	3.27
Seabrook	W1717WL	208	96.3	25.2	2.44
Sequoyah 1	W1717WL	373	171.7	32.3	3.09
	W1717WVH	56	26.0	32.2	3.65
Subtotal Sequoyah 1		429	197.7		
Sequoyah 2	W1717WL	415	191.2	32.6	3.10
	W1717WVH	57	26.4	37.4	3.69
Subtotal Sequoyah 2		472	217.6		
South Texas 1	WST17W	233	126.2	21.3	2.37
	^b Temps	3	1.6		
Subtotal South Texas 1		236	127.9		
South Texas 2	WST17W	188	101.5	24.2	2.53
Summer	W1717WL	329	151.5	31.6	3.16
	W1717WV5	140	59.4	39.6	3.68
	W1717WV+	35	14.6	41.7	3.91
Subtotal Summer		504	225.5		
Surry 1	W1515W	617	280.8	29.4	3.00
	W1515WL	58	26.7	43.5	3.64
	W1515WO	63	29.1	43.4	3.90
	W1717WL	2	0.9	16.1	1.86
Subtotal Surry 1		740	337.5		
Surry 2	W1515W	570	259.7	31.3	3.12
	W1515WL	61	28.0	38.5	3.61
	W1515WO	28	12.9	41.7	3.85
	W1717WL	2	0.9	35.3	3.10
Subtotal Surry 2		661	301.5		
Susquehanna 1	G4608GP	764	140.2	18.3	1.88
	G4608A	624	109.3	31.4	2.94
	G4609A	240	41.5	36.4	3.31
Subtotal Susquehanna 1		1,628	291.0		
Susquehanna 2	G4608GP	764	140.1	18.9	1.89
	G4609A	720	124.5	35.5	3.29
Subtotal Susquehanna 2		1,484	264.6		
Three Mile Island 1	B1515B4	550	255.2	27.7	2.77
	B1515B4Z	6	2.8	38.3	3.63
	B1515B8	26	12.1	39.5	3.63
	B1515W	4	1.8	25.0	3.95
	^b Temps	15	7.0		
Subtotal Three Mile Island 1		601	278.9		
Trojan	W1717WL	736	339.1	32.6	3.08
	W1717B	44	19.8	8.1	3.56
Subtotal Trojan		780	358.9		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Average Enrichment (weight percent)
Turkey Point 3	W1515WL	492	223.5	28.9	2.83
	W1515WO	165	75.9	38.6	3.36
Subtotal Turkey Point 3		657	299.3		
Turkey Point 4	W1515WL	508	231.0	30.0	2.86
	W1515WO	143	65.8	35.7	3.34
Subtotal Turkey Point 4		651	296.8		
Vermont Yankee	G4607G2	378	72.8	8.5	2.50
	G4607G3A	40	7.5	18.6	2.30
	G4608G4A	608	111.7	22.3	2.46
	G4608GP	664	121.7	26.5	2.89
	G4608GB	136	25.1	29.4	3.00
	G4608G8	136	24.2	32.3	3.20
	G4608G9	12	2.1	29.0	3.10
	G4609AIX	4	0.7	25.0	3.00
Subtotal Vermont Yankee		1,978	365.9		
Vogtle 1	W1717WL	352	163.4	33.1	3.15
	W1717WV5	56	23.7	44.3	3.85
Subtotal Vogtle 1		408	187.1		
Vogtle 2	W1717WL	238	110.4	30.4	2.90
Washington Nuclear 2	G4608GP	764	140.0	18.6	1.88
	G4608A	128	22.6	30.3	2.71
	G4608AP	164	28.9	31.6	2.66
	G4609A	140	24.6	31.5	2.72
Subtotal Washington Nuclear 2		1,196	216.1		
Waterford 3	C1616CSD	520	214.0	33.7	3.20
Wolf Creek 1	W1717WL	449	207.9	32.5	3.14
	W1717WVH	39	18.1	39.4	3.85
Subtotal Wolf Creek 1		488	226.0		
Yankee Rowe	XYR18W	76	20.8	25.5	4.94
	XYR16U	73	17.4	27.5	3.83
	XYR16A	228	53.2	29.0	3.70
	XYR16C	156	35.8	24.3	3.83
Subtotal Yankee Rowe		533	127.2		
Zion 1	W1515WL	567	258.6	31.5	2.93
	W1515WO	311	142.9	35.2	3.19
Subtotal Zion 1		878	401.5		
Zion 2	W1515WL	547	248.7	31.9	2.95
	W1515WO	259	118.9	35.1	3.25
Subtotal Zion 2		806	367.7		
Total		104,742	30,003.3		

^aNo burnup reported for temporarily discharged assemblies. See Technical Note 10 in Appendix E.

^bTemps represent temporarily discharged assemblies, as of December 31, 1994, as reported on Form RW-859, with no assigned assembly type code. See Technical Note 10 in Appendix E.

MTU = Metric tons of uranium; GWDt/MTU = Gigawattdays thermal per metric ton of uranium.

Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table B7. Assembly Type Summary by Assembly Type

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
B1515B3	Crystal River 3	1	0.5	23.0	1.93
B1515B4	Arkansas Nuclear 1	624	289.1	30.8	2.97
	Crystal River 3	496	230.3	26.7	2.77
	Davis-Besse	385	181.0	30.0	2.82
	Oconee 1	569	264.5	26.7	2.75
	Oconee 2	568	263.5	29.1	2.89
	Oconee 3	505	233.9	28.3	2.83
	Rancho Seco	437	202.5	28.2	2.92
	Three Mile Island 1	550	255.2	27.7	2.77
Subtotal B1515B4		4,134	1,919.9		
B1515B4Z	Crystal River 3	71	32.9	40.0	3.90
	Oconee 1	4	1.9	42.0	3.32
	Oconee 2	8	3.7	36.0	3.22
	Three Mile Island 1	6	2.8	38.3	3.63
Subtotal B1515B4Z		89	41.3		
B1515B5	Davis-Besse	58	27.2	38.0	3.13
B1515B5Z	Oconee 2	29	13.5	36.0	3.21
B1515B6	Oconee 1	60	27.7	43.0	3.61
	Oconee 2	57	26.3	41.7	3.40
	Oconee 3	13	6.0	37.0	3.20
Subtotal B1515B6		130	60.0		
B1515B7	Oconee 2	36	16.2	43.0	3.55
	Oconee 3	60	27.8	41.0	3.50
Subtotal B1515B7		96	44.0		
B1515B8	Davis-Besse	75	35.1	39.7	3.47
	Oconee 1	37	17.2	42.0	3.56
	Oconee 2	48	22.3	42.8	3.77
	Oconee 3	43	20.0	44.6	3.80
	Three Mile Island 1	26	12.1	39.5	3.63
Subtotal B1515B8		229	106.6		
B1515B9	Oconee 1	6	2.8	35.0	3.55
	Oconee 2	15	6.9	33.0	3.30
Subtotal B1515B9		21	9.7		
B1515BZ	Arkansas Nuclear 1	60	27.8	38.2	3.45
	Crystal River 3	40	18.5	38.0	3.85
	Oconee 1	206	95.5	37.9	3.33
	Oconee 2	91	42.2	36.2	3.22
	Oconee 3	187	86.7	34.1	3.24
	Rancho Seco	56	25.9	10.0	3.06
Subtotal B1515BZ		640	296.6		
B1515BGD	Oconee 1	4	1.7	43.0	3.92
B1515W	Three Mile Island 1	4	1.8	25.0	3.95
B1717B	Oconee 2	4	1.8	29.5	2.84
C1414C	Calvert Cliffs 1	888	340.5	33.0	3.19
	Calvert Cliffs 2	700	268.0	34.0	3.20
	Maine Yankee	922	349.0	27.0	2.73
	Millstone 2	361	138.9	28.6	2.61
	St. Lucie 1	497	189.6	28.9	2.81
Subtotal C1414C		3,368	1,286.0		

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
C1414A	Maine Yankee	223	82.5	36.9	3.20
	Millstone 2	71	26.4	37.1	3.33
	St. Lucie 1	467	174.1	37.3	3.51
Subtotal C1414A		761	282.9		
C1414W	Millstone 2	436	177.6	32.9	3.05
C1616CSD	Arkansas Nuclear 2	636	263.9	35.8	3.33
	San Onofre 2	592	244.2	32.1	3.26
	San Onofre 3	592	244.1	32.3	3.27
	Waterford 3	520	214.0	33.7	3.20
Subtotal C1616CSD		2,340	966.2		
C8016C	Palo Verde 1	368	151.7	32.2	3.00
	Palo Verde 2	384	156.5	31.5	3.03
	Palo Verde 3	380	156.4	30.5	3.04
Subtotal C8016C		1,132	464.7		
G2307G2A	Millstone 1	580	113.4	16.8	2.08
	Nine Mile Point 1	532	103.2	16.2	2.11
	Oyster Creek	560	109.3	17.3	2.11
Subtotal G2307G2A		1,672	325.9		
G2307G2B	Dresden 2	1,477	284.3	10.4	2.08
	Dresden 3	724	140.2	17.3	2.13
	Millstone 1	82	15.9	21.0	2.30
	Monticello	484	93.7	15.5	2.25
	Nine Mile Point 1	96	18.6	20.1	2.42
	Oyster Creek	156	30.2	22.7	2.62
	Pilgrim 1	580	111.9	14.9	2.19
	Quad Cities 1	693	134.0	20.1	2.13
	Quad Cities 2	755	146.0	19.8	2.14
Subtotal G2307G2B		5,047	974.9		
G2307G3	Dresden 2	32	6.0	23.7	2.29
	Dresden 3	52	9.8	24.0	2.30
	Millstone 1	154	28.9	24.1	2.45
	Monticello	20	3.7	23.8	2.30
	Nine Mile Point 1	108	20.2	26.0	2.50
	Quad Cities 1	28	5.2	29.0	2.24
Subtotal G2307G3		394	73.9		
G2308G4	Dresden 2	476	87.8	25.1	2.52
	Dresden 3	508	93.4	25.7	2.56
	Millstone 1	392	72.2	26.9	2.69
	Monticello	596	109.7	24.6	2.41
	Nine Mile Point 1	456	83.9	25.7	2.60
	Pilgrim 1	580	106.7	20.7	2.30
	Quad Cities 1	376	69.2	28.0	2.52
	Quad Cities 2	492	90.6	28.2	2.55
Subtotal G2308G4		3,876	713.6		
G2308G5	Dresden 2	160	28.3	28.7	2.67
	Millstone 1	148	26.2	26.4	2.66
	Monticello	112	19.8	30.8	2.74
	Nine Mile Point 1	184	32.5	27.9	2.77
	Oyster Creek	87	15.4	26.0	2.39
	Quad Cities 1	188	33.3	30.1	2.63
Subtotal G2308G5		879	155.6		

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
G2308GP	Dresden 2	228	40.4	28.4	2.64
	Dresden 3	200	35.4	28.0	2.65
	Millstone 1	360	63.8	27.9	2.79
	Monticello	404	71.6	32.2	2.72
	Nine Mile Point 1	436	77.2	26.4	2.79
	Oyster Creek	156	27.5	29.2	2.84
	Pilgrim 1	436	77.2	27.4	2.75
	Quad Cities 1	336	59.5	29.1	2.76
	Quad Cities 2	276	48.8	29.1	2.66
Subtotal G2308GP		2,832	501.3		
G2308GB	Millstone 1	212	37.7	27.8	3.00
	Oyster Creek	40	7.1	25.6	2.68
	Pilgrim 1	32	5.7	30.0	2.81
	Quad Cities 1	528	93.5	31.9	2.79
	Quad Cities 2	564	99.7	32.2	2.77
Subtotal G2308GB		1,376	243.7		
G2308G8A	Millstone 1	188	33.5	32.0	2.98
	Monticello	124	22.2	34.2	2.98
Subtotal G2308G8A		312	55.7		
G2308G8B	Monticello	140	24.2	39.0	3.18
	Oyster Creek	172	29.6	33.8	3.09
	Quad Cities 1	48	8.3	36.8	3.00
Subtotal G2308G8B		360	62.1		
G2308G10	Millstone 1	188	33.3	34.0	3.36
G2307A	Oyster Creek	260	47.4	23.5	2.64
G2308A	Dresden 2	412	71.3	31.8	2.82
	Dresden 3	380	66.0	31.9	2.74
	Oyster Creek	617	108.0	25.0	2.50
Subtotal G2308A		1,409	245.3		
G2308AP	Dresden 3	32	5.5	34.0	2.83
G2309A	Dresden 2	28	4.7	35.4	3.08
	Dresden 3	148	25.0	36.1	3.13
Subtotal G2309A		176	29.7		
G4607G2	Browns Ferry 1	168	32.9	10.4	1.11
	Browns Ferry 2	168	32.9	9.8	1.10
	Cooper Station	128	25.1	10.1	1.09
	FitzPatrick	132	25.8	9.1	1.11
	Peach Bottom 2	168	32.9	9.5	1.10
	Vermont Yankee	378	72.8	8.5	2.50
Subtotal G4607G2		1,142	222.4		
G4607G3A	Browns Ferry 1	596	111.8	24.0	2.50
	Browns Ferry 2	596	111.5	23.0	2.51
	Brunswick 2	564	105.7	16.6	1.90
	Duane Arnold	372	69.8	15.9	1.90
	FitzPatrick	428	80.2	22.8	2.50
	Hatch 1	560	104.9	20.9	2.33
	Peach Bottom 2	596	111.7	22.7	2.51
	Vermont Yankee	40	7.5	18.6	2.30
Subtotal G4607G3A		3,752	703.3		
G4607G3B	Cooper Station	420	79.8	25.2	2.51
	Peach Bottom 3	764	145.0	20.1	2.19
Subtotal G4607G3B		1,184	224.9		

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
G4608G4A	Browns Ferry 1	168	30.9	26.5	2.73
	Browns Ferry 2	168	30.9	28.2	2.73
	Cooper Station	72	13.2	25.0	2.51
	Duane Arnold	185	34.1	26.3	2.74
	FitzPatrick	132	24.3	26.0	2.74
	Hatch 1	92	16.9	23.1	2.51
	Peach Bottom 2	360	66.3	25.5	2.74
	Vermont Yankee	608	111.7	22.3	2.46
Subtotal G4608G4A		1,785	328.3		
G4608G4B	Browns Ferry 3	764	142.8	20.7	2.20
	Brunswick 1	560	104.4	18.3	2.11
	Brunswick 2	140	26.2	24.8	2.74
	Cooper Station	136	25.4	30.5	2.73
	Peach Bottom 3	187	34.9	24.1	2.74
Subtotal G4608G4B		1,787	333.6		
G4608G5	Browns Ferry 1	156	28.6	28.1	2.66
	Browns Ferry 2	232	42.3	28.9	2.87
	Browns Ferry 3	208	38.1	28.0	2.65
	Brunswick 1	360	65.9	28.9	2.78
	Brunswick 2	300	55.0	26.4	2.83
	Cooper Station	192	35.1	30.8	2.82
	FitzPatrick	136	24.8	26.8	2.78
	Hatch 1	384	70.3	22.9	2.43
	Hatch 2	509	93.4	19.2	1.97
	LaSalle County 1	627	114.9	17.9	1.81
	LaSalle County 2	764	139.6	19.7	1.89
	Peach Bottom 2	260	47.5	29.2	2.86
	Peach Bottom 3	252	46.1	29.7	2.83
Subtotal G4608G5		4,380	801.4		
G4608GP	Browns Ferry 1	492	89.9	23.7	2.84
	Browns Ferry 2	736	134.6	23.9	2.79
	Browns Ferry 3	58	10.6	25.5	2.66
	Brunswick 1	153	28.0	29.4	2.84
	Brunswick 2	247	45.2	26.6	2.68
	Clinton 1	624	114.6	16.5	1.71
	Cooper Station	636	116.5	29.6	2.75
	Duane Arnold	388	71.0	28.6	2.86
	Enrico Fermi 2	672	121.5	20.6	1.91
	FitzPatrick	549	100.3	27.8	2.90
	Grand Gulf 1	800	146.9	15.5	1.72
	Hatch 1	328	60.1	25.2	2.82
	Hatch 2	407	74.5	25.0	2.74
	Hope Creek	92	17.0	3.0	0.73
	LaSalle County 1	192	35.1	28.9	2.42
	Limerick 1	632	115.9	2.2	1.67
	Nine Mile Point 2	332	61.4	12.5	1.47
	Peach Bottom 2	552	100.8	28.0	2.89
	Peach Bottom 3	779	142.1	29.8	2.95
	Susquehanna 1	764	140.2	18.3	1.88
	Susquehanna 2	764	140.1	18.9	1.89
	Vermont Yankee	664	121.7	26.5	2.89
	Washington Nuclear 2	764	140.0	18.6	1.88
Subtotal G4608GP		11,625	2,128.1		

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
G4608GB	Brunswick 1	267	49.3	33.0	2.99
	Brunswick 2	208	38.4	33.3	2.99
	Clinton 1	100	18.6	28.4	2.84
	Cooper Station	272	50.4	30.2	2.79
	Duane Arnold	119	21.9	28.0	3.01
	FitzPatrick	196	36.1	29.8	2.99
	Hatch 1	549	101.3	26.0	2.70
	Hatch 2	891	164.2	27.3	2.84
	Hope Creek	1,148	212.4	24.5	2.42
	LaSalle County 1	245	45.3	33.6	3.03
	LaSalle County 2	224	41.7	33.0	3.00
	Limerick 1	990	182.9	18.8	2.32
	Limerick 2	654	121.6	17.2	1.71
	Nine Mile Point 2	308	56.8	23.5	2.19
	Peach Bottom 2	292	53.4	31.5	2.99
	Peach Bottom 3	217	39.9	30.5	2.99
	Perry 1	972	177.9	19.3	2.13
	River Bend 1	787	145.7	21.2	2.09
	Vermont Yankee	136	25.1	29.4	3.00
Subtotal G4608GB		8,575	1,583.0		
G4608G8	Brunswick 2	92	16.4	34.2	3.22
	Duane Arnold	216	38.5	33.9	3.06
	Enrico Fermi 2	188	33.7	31.0	3.19
	FitzPatrick	310	55.6	33.9	3.26
	Hatch 1	50	9.3	31.9	2.96
	LaSalle County 1	156	28.8	34.9	3.09
	LaSalle County 2	144	26.6	31.4	3.12
	Limerick 1	216	38.4	38.8	3.21
	Peach Bottom 2	208	36.9	35.4	3.20
	Peach Bottom 3	1	0.2	27.0	3.21
	River Bend 1	169	30.1	32.4	3.22
	Vermont Yankee	136	24.2	32.3	3.20
Subtotal G4608G8		1,886	338.7		
G4608G9	Browns Ferry 2	80	14.2	^a 0.0	3.25
	Brunswick 2	1	0.2	18.0	3.29
	Hatch 1	137	24.4	34.9	3.14
	Hatch 2	4	0.7	16.3	3.14
	LaSalle County 1	8	1.4	37.0	3.01
	Vermont Yankee	12	2.1	29.0	3.10
Subtotal G4608G9		242	43.0		
G4608G10	Cooper Station	4	0.7	29.0	2.64
	FitzPatrick	1	0.2	25.0	3.24
Subtotal G4608G10		5	0.9		
G4609G11	Enrico Fermi 2	40	6.8	^a 0.0	3.31
G4608A	Grand Gulf 1	584	103.0	30.3	2.94
	Susquehanna 1	624	109.3	31.4	2.94
	Washington Nuclear 2	128	22.6	30.3	2.71
Subtotal G4608A		1,336	234.9		
G4608AP	Grand Gulf 1	240	42.2	35.0	3.37
	Washington Nuclear 2	164	28.9	31.6	2.66
Subtotal G4608AP		404	71.1		

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
G4609A	Hatch 1	4	0.7	34.0	2.79
	Hatch 2	4	0.7	36.0	2.79
	Susquehanna 1	240	41.5	36.4	3.31
	Susquehanna 2	720	124.5	35.5	3.29
	Washington Nuclear 2	140	24.6	31.5	2.72
Subtotal G4609A		1,108	192.1		
G4609A5	Grand Gulf 1	36	6.4	31.9	3.39
G4609AIX	Vermont Yankee	4	0.7	25.0	3.00
G4608W	FitzPatrick	4	0.6	23.0	3.01
W1414W	Ginna	362	141.8	24.4	3.03
	Kewaunee	241	95.7	31.7	3.06
	Point Beach 1	12	4.8	38.7	3.21
	Point Beach 2	7	2.8	41.6	3.20
Subtotal W1414W		622	245.1		
W1414WL	Point Beach 1	517	206.0	31.3	3.06
	Point Beach 2	411	164.1	33.3	3.09
	Prairie Island 1	241	95.9	30.6	3.01
	Prairie Island 2	241	96.8	31.7	3.11
Subtotal W1414WL		1,410	562.7		
W1414WO	Ginna	203	71.6	40.6	3.59
	Point Beach 1	165	59.2	43.0	3.59
	Point Beach 2	203	72.8	41.8	3.52
	Prairie Island 1	197	70.7	41.3	3.67
	Prairie Island 2	197	70.8	40.2	3.65
Subtotal W1414WO		965	345.1		
W1414A	Ginna	194	72.3	37.1	3.22
	Kewaunee	447	169.3	35.3	3.34
	Prairie Island 1	89	33.6	37.5	3.44
	Prairie Island 2	76	28.8	37.3	3.45
Subtotal W1414A		806	303.9		
W1414ATR	Prairie Island 1	144	52.6	37.8	3.33
	Prairie Island 2	144	51.9	38.6	3.43
Subtotal W1414ATR		288	104.5		
W1414B	Ginna	2	0.8	24.4	3.22
W1515W	Indian Point 2	393	177.3	29.3	3.00
	Surry 1	617	280.8	29.4	3.00
	Surry 2	570	259.7	31.3	3.12
Subtotal W1515W		1,580	717.8		
W1515WL	Cook 1	193	87.5	27.5	2.78
	Indian Point 2	332	152.4	36.8	3.37
	Indian Point 3	409	186.8	31.5	3.03
	Robinson 2	314	141.5	23.7	2.63
	Surry 1	58	26.7	43.5	3.64
	Surry 2	61	28.0	38.5	3.61
	Turkey Point 3	492	223.5	28.9	2.83
	Turkey Point 4	508	231.0	30.0	2.86
	Zion 1	567	258.6	31.5	2.93
	Zion 2	547	248.7	31.9	2.95
Subtotal W1515WL		3,481	1,584.6		

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
W1515WO	Cook 1	367	169.0	37.6	3.43
	Indian Point 2	24	11.0	34.5	3.63
	Indian Point 3	173	79.9	36.6	3.35
	Surry 1	63	29.1	43.4	3.90
	Surry 2	28	12.9	41.7	3.85
	Turkey Point 3	165	75.9	38.6	3.36
	Turkey Point 4	143	65.8	35.7	3.34
	Zion 1	311	142.9	35.2	3.19
	Zion 2	259	118.9	35.1	3.25
Subtotal W1515WO		1,533	705.4		
W1515A	Cook 1	386	165.0	31.5	2.91
	Robinson 2	498	214.1	34.0	3.05
Subtotal W1515A		884	379.1		
W1515APL	Robinson 2	12	3.7	22.0	1.21
W1717WL	Beaver Valley 1	454	209.0	29.9	2.99
	Beaver Valley 2	156	71.8	26.5	2.60
	Callaway	193	89.0	24.4	2.60
	Comanche Peak 1	205	94.2	23.5	2.42
	Cook 2	365	167.6	28.8	2.98
	Diablo Canyon 1	337	155.4	33.5	3.06
	Diablo Canyon 2	337	155.2	31.0	2.97
	Farley 1	714	329.2	32.6	3.25
	Farley 2	556	256.6	33.2	3.29
	Harris 1	200	92.6	30.1	2.85
	McGuire 1	193	88.7	27.5	2.60
	McGuire 2	193	88.8	26.1	2.58
	Millstone 3	332	152.8	33.3	3.25
	North Anna 1	574	263.9	33.3	3.34
	North Anna 2	511	235.1	35.3	3.35
	Salem 1	624	287.5	32.8	3.23
	Salem 2	477	219.8	32.3	3.25
	Seabrook	208	96.3	25.2	2.44
	Sequoyah 1	373	171.7	32.3	3.09
	Sequoyah 2	415	191.2	32.6	3.10
	Summer	329	151.5	31.6	3.16
	Surry 1	2	0.9	16.1	1.86
	Surry 2	2	0.9	35.3	3.10
	Trojan	736	339.1	32.6	3.08
	Vogtle 1	352	163.4	33.1	3.15
	Vogtle 2	238	110.4	30.4	2.90
	Wolf Creek 1	449	207.9	32.5	3.14
Subtotal W1717WL		9,525	4,390.5		
W1717WO	Beaver Valley 1	2	0.8	35.8	3.20
	Braidwood 1	260	110.6	30.6	2.90
	Braidwood 2	193	81.6	27.7	2.60
	Byron 1	357	151.3	32.3	3.01
	Byron 2	281	119.6	32.6	2.88
	Callaway	84	35.9	39.7	3.61
	Catawba 1	448	190.1	31.1	2.92
	Catawba 2	444	188.5	32.0	3.02
	Comanche Peak 2	88	37.6	14.5	1.82
	Farley 1	2	0.8	46.3	3.11
	McGuire 1	404	171.6	36.6	3.44
	McGuire 2	404	171.7	36.8	3.35
	Salem 1	2	0.8	34.7	2.79
Subtotal W1717WO		2,969	1,261.1		

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
W1717WV5	Braidwood 1	64	27.2	38.9	3.78
	Braidwood 2	151	64.2	38.0	3.82
	Byron 1	163	69.2	38.8	3.79
	Byron 2	63	26.7	36.4	3.66
	Callaway	271	115.2	40.2	3.97
	Cook 2	36	15.3	39.1	3.66
	Diablo Canyon 1	127	54.0	41.3	4.13
	Diablo Canyon 2	147	62.5	44.2	4.20
	Farley 2	2	0.8	22.0	4.20
	Harris 1	76	32.3	44.6	3.99
	Summer	140	59.4	39.6	3.68
	Vogtle 1	56	23.7	44.3	3.85
Subtotal W1717WV5		1,296	550.5		
W1717WV+	Summer	35	14.6	41.7	3.91
W1717WVH	Beaver Valley 1	120	55.7	35.4	3.56
	Beaver Valley 2	104	48.2	37.4	3.54
	North Anna 1	48	22.3	46.7	4.12
	North Anna 2	55	25.5	40.2	4.10
	Salem 1	60	27.9	38.1	3.76
	Salem 2	48	22.3	41.5	3.90
	Sequoyah 1	56	26.0	32.2	3.65
	Sequoyah 2	57	26.4	37.4	3.69
	Wolf Creek 1	39	18.1	39.4	3.85
Subtotal W1717WVH		587	272.3		
W1717A	Cook 2	332	133.5	40.1	3.80
W1717B	Catawba 1	36	16.4	33.0	3.56
	McGuire 1	19	8.5	34.8	3.58
	McGuire 2	31	14.1	37.0	3.95
	Trojan	44	19.8	8.1	3.56
Subtotal W1717B		130	58.9		
WST17W	South Texas 1	233	126.2	21.3	2.37
	South Texas 2	188	101.5	24.2	2.53
Subtotal WST17W		421	227.8		
XBR11G	Big Rock Point	6	0.7	19.8	3.63
XBR07G	Big Rock Point	4	0.5	1.5	3.63
XBR08G	Big Rock Point	2	0.2	4.1	3.63
XBR09G	Big Rock Point	143	19.6	14.5	3.59
XBR09A	Big Rock Point	4	0.5	20.9	3.48
XBR11A	Big Rock Point	254	32.9	24.6	3.42
XBR11N	Big Rock Point	8	1.0	18.9	2.86
XDR06G	Dresden 1	1	0.1	21.3	1.47
XDR06G3B	Dresden 1	163	16.6	16.9	1.83
XDR06G3F	Dresden 1	96	9.8	20.0	2.25
XDR06G5	Dresden 1	106	11.2	19.0	2.26
XDR07GS	Dresden 1	1	0.1	29.0	3.10

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWD/MTU)	Average Enrichment (weight percent)
XDR08G	Dresden 1	1	0.1	23.3	1.95
XDR06U	Dresden 1	458	46.7	16.1	2.24
XDR06A	Dresden 1	66	6.3	4.5	2.23
XFC14C	Fort Calhoun	378	137.2	30.2	2.87
XFC14A	Fort Calhoun	192	67.8	37.3	3.57
XHB07G2	Humboldt Bay	88	6.7	18.2	2.11
XHB06G	Humboldt Bay	176	13.4	17.2	2.43
XHB06A	Humboldt Bay	126	8.8	9.0	2.40
XHN15W	Haddam Neck	309	128.4	27.9	3.58
XHN15MS	Haddam Neck	2	0.8	28.3	3.66
XHN15MZ	Haddam Neck	2	0.7	25.6	2.95
XHN15HS	Haddam Neck	1	0.4	32.2	3.99
XHN15HZ	Haddam Neck	2	0.7	18.5	3.26
XHN15B	Haddam Neck	576	237.1	33.7	3.99
XIP14W	Indian Point 1	160	30.6	16.7	4.11
XLC10L	LaCrosse	155	18.6	14.5	3.77
XLC10A	LaCrosse	178	19.3	14.9	3.69
XPA15C	Palisades	273	112.6	16.0	2.47
XPA15A	Palisades	520	203.9	30.8	2.95
XSL16C	St. Lucie 2	544	205.9	33.8	3.08
XSO14W	San Onofre 1	665	244.3	27.3	3.86
XYR18W	Yankee Rowe	76	20.8	25.5	4.94
XYR16U	Yankee Rowe	73	17.4	27.5	3.83
XYR16A	Yankee Rowe	228	53.2	29.0	3.70
XYR16C	Yankee Rowe	156	35.8	24.3	3.83
Total		^b 104,742	^c 30,003.3		

^aNo burnup reported for temporarily discharged assemblies. See Technical Note 10 in Appendix E.

^bTotal includes 87 temporarily discharged pressurized-water reactor (PWR) assemblies with no assigned assembly type code. See Technical Note 10 in Appendix E.

^cTotal includes 40.3 metric tons of uranium (MTU) for temporarily discharged PWR assemblies with no assigned assembly type code. See Technical Note 10 in Appendix E. GWD/MTU = Gigawattdays thermal per metric ton of uranium.

Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table B8. Spent Fuel Assemblies, by Type, Discharged by Year

Assembly Type Code	1968- 1969	1970- 1971	1972- 1973	1974- 1975	1976- 1977	1978- 1979	1980- 1981	1982- 1983	1984- 1985	1986- 1987	1988- 1989	1990- 1991	1992- 1993	1994 ^a	Temps ^b	Total
Boiling-Water Reactors (BWR)																
G2307G2A	--	41	447	917	174	93	--	--	--	--	--	--	--	--	--	1,672
G2307G2B	--	244	593	1,045	1,765	993	407	--	--	--	--	--	--	--	--	5,047
G2307G3	--	--	--	2	52	191	119	30	--	--	--	--	--	--	--	394
G2308G4	--	--	--	--	--	102	1,268	1,636	730	140	--	--	--	--	--	3,876
G2308G5	--	--	--	--	--	--	--	2	518	272	--	87	--	--	--	879
G2308GP	--	--	--	--	--	--	--	--	300	1,184	544	348	456	--	--	2,832
G2308GB	--	--	--	--	--	--	--	--	--	164	348	288	480	96	--	1,376
G2308G8A	--	--	--	--	--	--	--	--	--	--	--	212	100	--	--	312
G2308G8B	--	--	--	--	--	--	--	--	--	--	--	--	28	332	--	360
G2308G10	--	--	--	--	--	--	--	--	--	--	--	--	--	188	--	188
G2307A	--	--	--	--	4	124	108	24	--	--	--	--	--	--	--	260
G2308A	--	--	--	--	--	--	45	183	--	184	408	393	196	--	--	1,409
G2308AP	--	--	--	--	--	--	--	--	--	--	--	--	--	32	--	32
G2309A	--	--	--	--	--	--	--	--	--	--	--	4	24	148	--	176
G4607G2	--	--	50	328	589	175	--	--	--	--	--	--	--	--	--	1,142
G4607G3A	--	--	--	2	501	1,037	1,723	349	140	--	--	--	--	--	--	3,752
G4607G3B	--	--	--	--	192	747	209	36	--	--	--	--	--	--	--	1,184
G4608G4A	--	--	--	--	112	250	647	571	204	--	--	--	1	--	--	1,785
G4608G4B	--	--	--	--	--	140	1,100	353	194	--	--	--	--	--	--	1,787
G4608G5	--	--	--	--	--	--	111	1,170	1,426	312	987	216	158	--	--	4,380
G4608GP	--	--	--	--	--	--	26	199	2,086	3,254	2,500	1,746	1,066	244	504	11,625
G4608GB	--	--	--	--	--	--	--	--	1	233	1,738	2,436	3,078	1,088	1	8,575
G4608G8	--	--	--	--	--	--	--	--	--	--	--	107	690	1,089	--	1,886
G4608G9	--	--	--	--	--	--	--	--	--	--	--	1	21	140	80	242
G4608G10	--	--	--	--	--	--	--	--	--	--	--	--	4	1	--	5
G4609G11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	40
G4608A	--	--	--	--	--	--	--	--	--	--	220	632	484	--	--	1,336
G4608AP	--	--	--	--	--	--	--	--	--	--	--	--	248	156	--	404
G4609A	--	--	--	--	--	--	--	--	--	--	1	231	628	248	--	1,108
G4609A5	--	--	--	--	--	--	--	--	--	--	--	--	36	--	--	36
G4609AIX	--	--	--	--	--	--	--	--	--	--	--	--	4	--	--	4
G4608W	--	--	--	--	--	--	--	--	--	--	--	4	--	--	--	4
XBR11G	--	--	6	--	--	--	--	--	--	--	--	--	--	--	--	6
XBR07G	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4
XBR08G	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2
XBR09G	--	5	55	29	32	18	4	--	--	--	--	--	--	--	--	143
XBR09A	--	--	--	--	4	--	--	--	--	--	--	--	--	--	--	4
XBR11A	--	--	--	--	--	8	18	44	36	24	42	40	22	19	1	254
XBR11N	--	--	--	2	6	--	--	--	--	--	--	--	--	--	--	8
XDR06G	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
XDR06G3B	58	69	5	22	9	--	--	--	--	--	--	--	--	--	--	163

See footnotes at end of table.

Table B8. Spent Fuel Assemblies, by Type, Discharged by Year (Continued)

Assembly Type Code	1968- 1969	1970- 1971	1972- 1973	1974- 1975	1976- 1977	1978- 1979	1980- 1981	1982- 1983	1984- 1985	1986- 1987	1988- 1989	1990- 1991	1992- 1993	1994 ^a	Temps ^b	Total
Boiling-Water Reactors (BWR)																
XDR06G3F	24	20	3	36	13	--	--	--	--	--	--	--	--	--	--	96
XDR06G5	9	15	11	2	15	54	--	--	--	--	--	--	--	--	--	106
XDR07GS	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
XDR08G	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
XDR06U	1	8	33	43	29	344	--	--	--	--	--	--	--	--	--	458
XDR06A	--	--	--	--	--	66	--	--	--	--	--	--	--	--	--	66
XHB07G2	--	33	55	--	--	--	--	--	--	--	--	--	--	--	--	88
XHB06G	--	7	51	56	62	--	--	--	--	--	--	--	--	--	--	176
XHB06A	--	--	--	4	122	--	--	--	--	--	--	--	--	--	--	126
XLC10L	--	--	56	25	32	28	12	2	--	--	--	--	--	--	--	155
XLC10A	--	--	--	--	--	--	--	50	28	100	--	--	--	--	--	178
Total BWR	101	442	1,365	2,513	3,713	4,370	5,797	4,649	5,663	5,867	6,788	6,745	7,724	3,781	626	60,144

See footnotes at end of table.

Table B8. Spent Fuel Assemblies, by Type, Discharged by Year (Continued)

Assembly Type Code	1968- 1969	1970- 1971	1972- 1973	1974- 1975	1976- 1977	1978- 1979	1980- 1981	1982- 1983	1984- 1985	1986- 1987	1988- 1989	1990- 1991	1992- 1993	1994 ^a	Temps ^b	Total
Pressurized-Water Reactors (PWR)																
B1515B3	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	1
B1515B4	--	--	--	53	450	683	555	546	499	380	382	437	135	1	13	4,134
B1515B4Z	--	--	--	--	--	--	--	--	--	--	--	--	18	71	--	89
B1515B5	--	--	--	--	--	--	--	--	--	--	--	--	57	1	--	58
B1515B5Z	--	--	--	--	--	--	--	--	--	--	--	--	29	--	--	29
B1515B6	--	--	--	--	--	--	--	--	--	--	--	--	113	17	--	130
B1515B7	--	--	--	--	--	--	--	--	--	--	--	--	96	--	--	96
B1515B8	--	--	--	--	--	--	--	--	--	--	--	--	79	150	--	229
B1515B9	--	--	--	--	--	--	--	--	--	--	--	--	--	21	--	21
B1515BZ	--	--	--	--	--	--	--	--	--	72	269	199	100	--	--	640
B1515BGD	--	--	--	--	--	--	--	--	--	3	1	--	--	--	--	4
B1515W	--	--	--	--	--	--	--	--	--	--	--	--	4	--	--	4
B1717B	--	--	--	--	--	--	4	--	--	--	--	--	--	--	--	4
C1414C	--	--	--	224	147	645	588	467	426	220	184	64	310	89	4	3,368
C1414A	--	--	--	--	--	--	--	--	72	97	147	194	86	155	10	761
C1414W	--	--	--	--	--	--	--	3	59	130	73	85	73	13	--	436
C1616CSD	--	--	--	--	--	--	35	125	196	443	519	371	485	166	--	2,340
C8016C	--	--	--	--	--	--	--	--	--	73	259	279	396	124	1	1,132
W1414W	--	12	109	37	130	135	123	42	14	1	--	14	4	1	--	622
W1414WL	--	--	44	129	301	252	261	158	74	129	51	11	--	--	--	1,410
W1414WO	--	--	--	--	--	--	--	1	3	11	182	299	331	138	--	965
W1414A	--	--	--	--	2	--	2	178	177	130	89	97	90	37	4	806
W1414ATR	--	--	--	--	--	--	--	--	63	138	83	3	1	--	--	288
W1414B	--	--	--	--	2	--	--	--	--	--	--	--	--	--	--	2
W1515W	--	--	--	117	314	217	178	198	189	104	137	116	--	--	10	1,580
W1515WL	--	--	53	283	407	781	331	348	407	439	167	76	188	1	--	3,481
W1515WO	--	--	--	--	--	--	--	--	1	80	324	349	538	240	1	1,533
W1515A	--	--	--	--	--	50	180	176	154	133	49	49	93	--	--	884
W1515APL	--	--	--	--	--	--	--	--	--	--	--	--	12	--	--	12
W1717WL	--	--	--	--	2	243	442	848	1,231	1,550	1,391	1,919	1,569	298	32	9,525
W1717WO	--	--	--	--	--	--	--	--	5	344	666	980	668	306	--	2,969
W1717WV5	--	--	--	--	--	--	--	--	--	--	4	101	589	600	2	1,296
W1717WV+	--	--	--	--	--	--	--	--	--	--	--	--	--	35	--	35
W1717WVH	--	--	--	--	--	--	--	--	--	--	--	41	351	192	3	587
W1717A	--	--	--	--	--	--	--	--	--	60	71	85	74	42	--	332
W1717B	--	--	--	--	--	--	--	--	--	--	--	3	81	46	--	130
WST17W	--	--	--	--	--	--	--	--	--	--	36	227	154	--	4	421
XFC14C	--	--	--	25	88	44	80	20	21	12	--	2	86	--	--	378
XFC14A	--	--	--	--	--	--	--	--	69	34	44	37	8	--	--	192
XHN15W	--	103	102	48	56	--	--	--	--	--	--	--	--	--	--	309
XHN15MS	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	2
XHN15MZ	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	2

See footnotes at end of table.

Table B8. Spent Fuel Assemblies, by Type, Discharged by Year (Continued)

Assembly Type Code	1968- 1969	1970- 1971	1972- 1973	1974- 1975	1976- 1977	1978- 1979	1980- 1981	1982- 1983	1984- 1985	1986- 1987	1988- 1989	1990- 1991	1992- 1993	1994 ^a	Temps ^b	Total
Pressurized-Water Reactors (PWR)																
XHN15HS	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	1
XHN15HZ	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	2
XHN15B	--	--	--	--	50	49	106	49	53	109	54	53	53	--	--	576
XIP14W	--	--	40	120	--	--	--	--	--	--	--	--	--	--	--	160
XPA15C	--	--	--	205	--	8	60	--	--	--	--	--	--	--	--	273
XPA15A	--	--	--	--	--	128	8	68	52	--	52	75	136	--	1	520
XSL16C	--	--	--	--	--	--	--	--	80	156	84	76	68	80	--	544
XSO14W	--	97	57	53	53	52	52	--	52	--	52	40	157	--	--	665
XYR18W	--	--	36	40	--	--	--	--	--	--	--	--	--	--	--	76
XYR16U	--	--	--	37	36	--	--	--	--	--	--	--	--	--	--	73
XYR16A	--	--	--	--	--	40	36	40	76	36	--	--	--	--	--	228
XYR16C	--	--	--	--	--	--	--	--	--	--	40	116	--	--	--	156
Total PWR	--	212	447	1,372	2,038	3,327	3,041	3,267	3,973	4,884	5,410	6,398	7,233	2,824	^c 172	^c 44,598

^aSome data for previous years have been revised. Current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change. See Technical Note 12 in Appendix E.

^bTemps are temporarily discharged assemblies, as of December 31, 1994, as reported on Form RW-859.

^cNo assigned assembly type for 87 temporarily discharged PWR assemblies. These PWR assemblies are included in the column totals. See Technical Note 10 in Appendix E.

-- = Not applicable.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table B9. Initial Uranium Content of Spent Fuel Assemblies, by Type, Discharged by Year
(Metric tons of uranium)

Assembly Type Code	1968- 1969	1969-1970	1972- 1973	1974- 1975	1976-1977	1978- 1979	1980- 1981	1982- 1983	1984-1985	1986-1987	1988-1989	1990-1991	1992- 1993	1994 ^a	Temps ^b	Total
Boiling-Water Reactors (BWR)																
G2307G2A	--	7.9	87.0	178.8	33.9	18.1	--	--	--	--	--	--	--	--	--	325.9
G2307G2B	--	47.1	114.44	202.2	340.8	192.0	78.5	--	--	--	--	--	--	--	--	974.9
G2307G3	--	--	--	0.4	9.7	35.8	22.3	5.6	--	--	--	--	--	--	--	73.9
G2308G4	--	--	--	--	--	18.7	233.5	301.3	134.4	25.8	--	--	--	--	--	713.6
G2308G5	--	--	--	--	--	--	--	0.4	91.7	48.1	--	15.4	--	--	--	155.6
G2308GP	--	--	--	--	--	--	--	--	53.1	209.5	96.4	61.7	80.6	--	--	501.3
G2308GB	--	--	--	--	--	--	--	--	--	29.1	61.9	51.2	84.7	16.9	--	243.7
G2308G8A	--	--	--	--	--	--	--	--	--	--	--	37.8	17.9	--	--	55.7
G2308G8B	--	--	--	--	--	--	--	--	--	--	--	--	4.8	57.2	--	62.1
G2308G10	--	--	--	--	--	--	--	--	--	--	--	--	--	33.3	--	33.3
G2307A	--	--	--	--	0.7	22.6	19.7	4.4	--	--	--	--	--	--	--	47.4
G2308A	--	--	--	--	--	--	7.9	32.0	--	32.2	71.0	68.2	33.9	--	--	245.3
G2308AP	--	--	--	--	--	--	--	--	--	--	--	--	--	5.5	--	5.5
G2309A	--	--	--	--	--	--	--	--	--	--	--	0.7	4.0	25.0	--	29.7
G4607G2	--	--	9.5	63.3	115.3	34.2	--	--	--	--	--	--	--	--	--	222.4
G4607G3A	--	--	--	0.4	93.9	194.4	323.1	65.3	26.2	--	--	--	--	--	--	703.3
G4607G3B	--	--	--	--	36.6	141.7	39.7	6.8	--	--	--	--	--	--	--	224.9
G4608G4A	--	--	--	--	20.6	45.9	119.1	105.1	37.4	--	--	--	0.2	--	--	328.3
G4608G4B	--	--	--	--	--	26.1	205.4	65.9	36.2	--	--	--	--	--	--	333.6
G4608G5	--	--	--	--	--	--	20.3	213.9	261.1	57.1	180.7	39.5	28.8	--	--	801.4
G4608GP	--	--	--	--	--	--	4.8	36.4	381.4	596.4	458.2	319.8	194.1	44.7	92.2	2,128.1
G4608GB	--	--	--	--	--	--	--	--	0.2	43.2	320.9	450.0	569.6	199.0	0.2	1,583.0
G4608G8	--	--	--	--	--	--	--	--	--	--	--	19.0	124.1	195.5	--	338.7
G4608G9	--	--	--	--	--	--	--	--	--	--	--	0.2	3.7	24.9	14.2	43.0
G4608G10	--	--	--	--	--	--	--	--	--	--	--	--	0.7	0.2	--	0.9
G4609G11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6.8	6.8
G4608A	--	--	--	--	--	--	--	--	--	--	38.8	111.5	84.5	--	--	234.9
G4608AP	--	--	--	--	--	--	--	--	--	--	--	--	43.6	27.5	--	71.1
G4609A	--	--	--	--	--	--	--	--	--	--	0.2	40.0	109.1	42.8	--	192.1
G4609A5	--	--	--	--	--	--	--	--	--	--	--	--	6.4	--	--	6.4
G4609AIX	--	--	--	--	--	--	--	--	--	--	--	--	0.7	--	--	0.7
G4608W	--	--	--	--	--	--	--	--	--	--	--	0.6	--	--	--	0.6
XBR11G	--	--	0.7	--	--	--	--	--	--	--	--	--	--	--	--	0.7
XBR07G	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5
XBR08G	0.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.2
XBR09G	--	0.7	7.5	4.0	4.4	2.5	0.6	--	--	--	--	--	--	--	--	19.6
XBR09A	--	--	--	--	0.5	--	--	--	--	--	--	--	--	--	--	0.5
XBR11A	--	--	--	--	--	1.0	2.3	5.6	4.6	3.1	5.5	5.3	2.9	2.5	0.1	32.9
XBR11N	--	--	--	0.3	0.8	--	--	--	--	--	--	--	--	--	--	1.0
XDR06G	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1
XDR06G3B	5.9	7.0	0.5	2.2	0.9	--	--	--	--	--	--	--	--	--	--	16.6

See footnotes at end of table.

Table B9. Initial Uranium Content of Spent Fuel Assemblies, by Type, Discharged by Year (Continued)
(Metric tons of uranium)

Assembly Type Code	1968- 1969	1969-1970	1972- 1973	1974- 1975	1976-1977	1978- 1979	1980- 1981	1982- 1983	1984-1985	1986-1987	1988-1989	1990-1991	1992- 1993	1994 ^a	Temps ^b	Total
Boiling-Water Reactors (BWR)																
XDR06G3F	2.4	2.0	0.3	3.7	1.3	--	--	--	--	--	--	--	--	--	--	9.8
XDR06G5	1	1.6	1.2	0.2	1.6	5.7	--	--	--	--	--	--	--	--	--	11.2
XDR07GS	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1
XDR08G	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1
XDR06U	0.1	0.8	3.4	4.4	3	35.0	--	--	--	--	--	--	--	--	--	46.7
XDR06A	--	--	--	--	--	6.3	--	--	--	--	--	--	--	--	--	6.3
XHB07G2	--	2.5	4.2	--	--	--	--	--	--	--	--	--	--	--	--	6.7
XHB06G	--	0.5	3.9	4.3	4.8	--	--	--	--	--	--	--	--	--	--	13.4
XHB06A	--	--	--	0.3	8.5	--	--	--	--	--	--	--	--	--	--	8.8
XLC10L	--	--	6.7	3.0	3.9	3.4	1.4	0.2	--	--	--	--	--	--	--	18.6
XLC10A	--	--	--	--	--	--	--	5.4	3.0	10.8	--	--	--	--	--	19.3
Total BWR	10.4	70.3	239.33	467.4	681.2	783.5	1,078.5	848.5	1,029.6	1,055.3	1,233.6	1,220.80.	1,394.5	675.0	113.5	10,901.3

See footnotes at end of table.

Table B9. Initial Uranium Content of Spent Fuel Assemblies, by Type, Discharged by Year (Continued)
(Metric tons of uranium)

Assembly Type Code	1968- 1969	1969-1970	1972- 1973	1974- 1975	1976-1977	1978- 1979	1980- 1981	1982- 1983	1984-1985	1986-1987	1988-1989	1990-1991	1992- 1993	1994 ^a	Temps ^b	Total
Pressurized-Water Reactors (PWR)																
B1515B3	--	--	--	--	--	--	--	--	--	--	--	--	0.5	--	--	0.5
B1515B4	--	--	--	24.8	209.2	316.6	257.2	254.8	231.7	176.0	177.4	203.3	62.5	0.5	6.0	1,919.9
B1515B4Z	--	--	--	--	--	--	--	--	--	--	--	--	8.3	32.9	--	41.3
B1515B5	--	--	--	--	--	--	--	--	--	--	--	--	26.7	0.5	--	27.2
B1515B5Z	--	--	--	--	--	--	--	--	--	--	--	--	13.5	--	--	13.5
B1515B6	--	--	--	--	--	--	--	--	--	--	--	--	52.2	7.9	--	60.0
B1515B7	--	--	--	--	--	--	--	--	--	--	--	--	44.0	--	--	44.0
B1515B8	--	--	--	--	--	--	--	--	--	--	--	--	36.7	69.9	--	106.6
B1515B9	--	--	--	--	--	--	--	--	--	--	--	--	--	9.7	--	9.7
B1515BZ	--	--	--	--	--	--	--	--	--	33.4	124.6	92.3	46.4	--	--	296.6
B1515BGD	--	--	--	--	--	--	--	--	--	1.3	0.4	--	--	--	--	1.7
B1515W	--	--	--	--	--	--	--	--	--	--	--	--	1.8	--	--	1.8
B1717B	--	--	--	--	--	--	1.8	--	--	--	--	--	--	--	--	1.8
C1414C	--	--	--	84.2	57.6	245.1	224.3	179.6	162.1	84.4	71.5	24.0	118.4	33.3	1.5	1,286.0
C1414A	--	--	--	--	--	--	--	--	27.0	35.0	54.3	72.5	31.9	58.5	3.7	282.9
C1414W	--	--	--	--	--	--	--	1.2	24.0	52.9	29.8	34.7	29.8	5.3	--	177.6
C1616CSD	--	--	--	--	--	--	14.9	51.3	83.7	182.8	215.7	152.8	197.2	67.8	--	966.2
C8016C	--	--	--	--	--	--	--	--	--	31.1	107.0	112.5	162.0	51.6	0.4	464.7
W1414W	--	4.6	42.7	14.4	51.1	53.0	48.9	16.8	5.6	0.4	--	5.6	1.6	0.4	--	245.1
W1414WL	--	--	17.5	50.5	119.4	100.6	104.8	63.5	29.7	51.8	20.5	4.4	--	--	--	562.7
W1414WO	--	--	--	--	--	--	--	0.4	1.1	3.9	65.1	107.2	118.3	49.2	--	345.1
W1414A	--	--	--	--	0.7	--	0.7	67.3	66.7	48.8	33.5	36.4	34.1	14.0	1.5	303.9
W1414ATR	--	--	--	--	--	--	--	--	23.0	50.3	29.7	1.1	0.4	--	--	104.5
W1414B	--	--	--	--	0.8	--	--	--	--	--	--	--	--	--	--	0.8
W1515W	--	--	--	53.0	141.2	98.3	81.1	90.0	86.0	47.6	62.8	53.3	--	--	4.6	717.8
W1515WL	--	--	24.2	126.8	183.9	354.2	151.3	159.0	186.1	200.6	76.5	35.0	86.6	0.5	--	1,584.6
W1515WO	--	--	--	--	--	--	--	--	0.5	36.8	149.1	160.6	247.3	110.7	0.5	705.4
W1515A	--	--	--	--	--	21.4	77.1	75.3	66.0	57.2	21.1	21.2	39.8	--	--	379.1
W1515APL	--	--	--	--	--	--	--	--	--	--	--	--	3.7	--	--	3.7
W1717WL	--	--	--	--	0.9	111.7	203.2	389.3	564.9	713.5	642.2	886.8	725.3	138.0	14.7	4,390.5
W1717WO	--	--	--	--	--	--	--	--	2.1	145.9	283.3	415.8	283.8	130.2	--	1,261.1
W1717WV5	--	--	--	--	--	--	--	--	--	--	1.7	42.9	250.2	254.9	0.9	550.5
W1717WV+	--	--	--	--	--	--	--	--	--	--	--	--	--	14.6	--	14.6
W1717WVH	--	--	--	--	--	--	--	--	--	--	--	19.1	162.8	89.0	1.4	272.3
W1717A	--	--	--	--	--	--	--	--	--	24.1	28.5	34.2	29.8	16.9	--	133.5
W1717B	--	--	--	--	--	--	--	--	--	--	--	1.3	36.7	20.9	--	58.9
WST17W	--	--	--	--	--	--	--	--	--	--	19.6	122.7	83.3	--	2.2	227.8
XFC14C	--	--	--	9.3	31.7	16.4	29.3	7.3	7.6	4.4	--	0.7	30.5	--	--	137.2
XFC14A	--	--	--	--	--	--	--	--	24.7	12.1	15.2	13.0	2.9	--	--	67.8
XHN15W	--	43.3	42.3	19.8	23	--	--	--	--	--	--	--	--	--	--	128.4
XHN15MS	--	--	0.8	--	--	--	--	--	--	--	--	--	--	--	--	0.8
XHN15MZ	--	--	0.7	--	--	--	--	--	--	--	--	--	--	--	--	0.7

Table B9. Initial Uranium Content of Spent Fuel Assemblies, by Type, Discharged by Year (Continued)
(Metric tons of uranium)

Assembly Type Code	1968- 1969	1969-1970	1972- 1973	1974- 1975	1976-1977	1978- 1979	1980- 1981	1982- 1983	1984-1985	1986-1987	1988-1989	1990-1991	1992- 1993	1994 ^a	Temps ^b	Total	
Pressurized-Water Reactors (PWR)																	
XHN15HS	--	--	--	0.4	--	--	--	--	--	--	--	--	--	--	--	0.4	
XHN15HZ	--	--	0.7	--	--	--	--	--	--	--	--	--	--	--	--	0.7	
XHN15B	--	--	--	--	20.6	20.2	43.6	20.2	21.8	44.9	22.1	21.8	21.9	--	--	237.1	
XIP14W	--	--	7.8	22.8	--	--	--	--	--	--	--	--	--	--	--	30.6	
XPA15C	--	--	--	84.3	--	3.3	24.9	--	--	--	--	--	--	--	--	112.6	
XPA15A	--	--	--	--	--	50.5	3.1	26.3	20.2	--	20.4	29.3	53.7	--	0.4	203.9	
XSL16C	--	--	--	--	--	--	--	--	31.0	57.9	31.8	29.3	25.8	30.2	--	205.9	
XSO14W	--	35.6	20.4	19.3	19.2	19.2	19.2	--	19.3	--	19.2	14.8	58.1	--	--	244.3	
XYR18W	--	--	9.8	10.9	--	--	--	--	--	--	--	--	--	--	--	20.8	
XYR16U	--	--	--	8.8	8.6	--	--	--	--	--	--	--	--	--	--	17.4	
XYR16A	--	--	--	--	--	9.4	8.5	9.4	17.7	8.3	--	--	--	--	--	53.2	
XYR16C	--	--	--	--	--	--	--	--	--	--	9.2	26.6	--	--	--	35.8	
Total PWR	--	83.5	167.00	529.4	867.9	1,419.8	1,294.0	1,411.7	1,702.3	2,105.1	2,332.2	2,775.45	3,128.3	16,	1,207.5	^c 77.9	^c 19,102.0

^aSome data for previous years have been revised. Current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change. See Technical Note 12 in Appendix E.

^bTemps are temporarily discharged assemblies, as of December 31, 1994, as reported on Form RW-859.

^cTotal includes 40.3 metric tons of uranium (MTU) for temporarily discharged PWR assemblies with no assigned assembly type code. See Technical Note 10 in Appendix E.

-- = Not applicable.

Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Table B10. Burnup of Spent Fuel Assemblies, by Type, Discharged by Year
(Gigawattdays thermal per metric ton of uranium)

Assembly Type Code	1968- 1969	1970- 1971	1972- 1973	1974- 1975	1976- 1977	1978- 1979	1980- 1981	1982- 1983	1984- 1985	1986- 1987	1988- 1989	1990- 1991	1992- 1993	1994 ^a	Temps ^b
Boiling-Water Reactors (BWR)															
G2307G2A	--	7.7	13.2	17.8	20.0	21.7	--	--	--	--	--	--	--	--	--
G2307G2B	--	1.4	4.4	13.4	17.3	23.4	23.0	--	--	--	--	--	--	--	--
G2307G3	--	--	--	9.0	22.2	25.6	25.1	25.4	--	--	--	--	--	--	--
G2308G4	--	--	--	--	--	23.9	24.0	25.8	27.0	24.7	--	--	--	--	--
G2308G5	--	--	--	--	--	--	--	22.5	28.2	29.8	--	26.0	--	--	--
G2308GP	--	--	--	--	--	--	--	--	27.8	27.6	29.5	30.5	29.2	--	--
G2308GB	--	--	--	--	--	--	--	--	--	27.6	29.0	30.2	34.1	33.8	--
G2308G8A	--	--	--	--	--	--	--	--	--	--	--	32.3	34.1	--	--
G2308G8B	--	--	--	--	--	--	--	--	--	--	--	--	38.4	36.1	--
G2308G10	--	--	--	--	--	--	--	--	--	--	--	--	--	34.0	--
G2307A	--	--	--	--	25.2	24.7	22.6	21.8	--	--	--	--	--	--	--
G2308A	--	--	--	--	--	--	25.1	27.3	--	23.9	27.3	32.2	32.4	--	--
G2308AP	--	--	--	--	--	--	--	--	--	--	--	--	--	34.0	--
G2309A	--	--	--	--	--	--	--	--	--	--	--	36.0	35.3	36.1	--
G4607G2	--	--	3.7	9.2	9.8	9.9	--	--	--	--	--	--	--	--	--
G4607G3A	--	--	--	4.7	12.8	19.9	23.6	23.1	22.8	--	--	--	--	--	--
G4607G3B	--	--	--	--	10.6	23.5	25.9	26.7	--	--	--	--	--	--	--
G4608G4A	--	--	--	--	18.9	19.6	24.6	26.9	28.5	--	--	--	33.0	--	--
G4608G4B	--	--	--	--	--	17.1	20.7	24.2	23.0	--	--	--	--	--	--
G4608G5	--	--	--	--	--	--	7.9	26.6	23.6	14.9	25.0	23.4	30.2	--	--
G4608GP	--	--	--	--	--	--	23.2	26.7	22.3	20.4	23.0	24.1	24.4	31.3	--
G4608GB	--	--	--	--	--	--	--	--	5.5	9.2	17.6	24.7	28.0	29.1	23.0
G4608G8	--	--	--	--	--	--	--	--	--	--	--	32.0	32.2	35.2	--
G4608G9	--	--	--	--	--	--	--	--	--	--	--	18.0	28.1	35.0	--
G4608G10	--	--	--	--	--	--	--	--	--	--	--	--	29.0	25.0	--
G4609G11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
G4608A	--	--	--	--	--	--	--	--	--	--	26.7	29.8	34.0	--	--
G4608AP	--	--	--	--	--	--	--	--	--	--	--	--	34.8	31.8	--
G4609A	--	--	--	--	--	--	--	--	--	--	24.0	33.5	35.1	36.9	--
G4609A5	--	--	--	--	--	--	--	--	--	--	--	--	31.9	--	--
G4609AIX	--	--	--	--	--	--	--	--	--	--	--	--	25.0	--	--
G4608W	--	--	--	--	--	--	--	--	--	--	--	23.0	--	--	--
XBR11G	--	--	19.8	--	--	--	--	--	--	--	--	--	--	--	--
XBR07G	1.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--
XBR08G	4.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
XBR09G	--	8.2	11.5	12.9	17.7	20.5	21.3	--	--	--	--	--	--	--	--
XBR09A	--	--	--	--	20.9	--	--	--	--	--	--	--	--	--	--
XBR11A	--	--	--	--	--	25.7	25.5	25.3	23.4	27.3	24.4	24.4	24.4	23.8	--
XBR11N	--	--	--	16.3	19.8	--	--	--	--	--	--	--	--	--	--
XDR06G	21.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
XDR06G3B	16.3	16.6	22.7	18.3	16.7	--	--	--	--	--	--	--	--	--	--

See footnotes at end of table.

Table B10. Burnup of Spent Fuel Assemblies, by Type, Discharged by Year (Continued)
(Gigawattdays thermal per metric ton of uranium)

Assembly Type Code	1968- 1969	1970- 1971	1972- 1973	1974- 1975	1976- 1977	1978- 1979	1980- 1981	1982- 1983	1984- 1985	1986- 1987	1988- 1989	1990- 1991	1992- 1993	1994 ^a	Temps ^b
Boiling-Water Reactors (BWR)															
XDR06G3F	14.7	21.3	21.5	22.3	21.3	--	--	--	--	--	--	--	--	--	--
XDR06G5	9.3	13.5	17.8	19.5	22.2	21.5	--	--	--	--	--	--	--	--	--
XDR07GS	29.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
XDR08G	23.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
XDR06U	5.2	12.5	16.4	17.3	22.4	15.5	--	--	--	--	--	--	--	--	--
XDR06A	--	--	--	--	--	4.5	--	--	--	--	--	--	--	--	--
XHB07G2	--	17.7	18.5	--	--	--	--	--	--	--	--	--	--	--	--
XHB06G	--	10.0	17.1	18.0	17.3	--	--	--	--	--	--	--	--	--	--
XHB06A	--	--	--	17.5	8.8	--	--	--	--	--	--	--	--	--	--
XLC10L	--	--	13.0	15.5	16.5	14.0	15.9	11.0	--	--	--	--	--	--	--
XLC10A	--	--	--	--	--	--	--	16.9	18.0	13.0	--	--	--	--	--

See footnotes at end of table.

Table B10. Burnup of Spent Fuel Assemblies, by Type, Discharged by Year (Continued)
(Gigawattdays thermal per metric ton of uranium)

Assembly Type Code	1968- 1969	1970- 1971	1972- 1973	1974- 1975	1976- 1977	1978- 1979	1980- 1981	1982- 1983	1984- 1985	1986- 1987	1988- 1989	1990- 1991	1992- 1993	1994 ^a	Temps ^b
Pressurized-Water Reactors (PWR)															
B1515B3	--	--	--	--	--	--	--	--	--	--	--	--	23.0	--	--
B1515B4	--	--	--	11.6	21.1	25.7	27.7	28.3	31.0	32.2	31.7	32.9	35.6	23.0	8.0
B1515B4Z	--	--	--	--	--	--	--	--	--	--	--	--	38.1	40.0	--
B1515B5	--	--	--	--	--	--	--	--	--	--	--	--	38.0	39.0	--
B1515B5Z	--	--	--	--	--	--	--	--	--	--	--	--	36.0	--	--
B1515B6	--	--	--	--	--	--	--	--	--	--	--	--	41.5	44.0	--
B1515B7	--	--	--	--	--	--	--	--	--	--	--	--	41.7	--	--
B1515B8	--	--	--	--	--	--	--	--	--	--	--	--	41.7	41.6	--
B1515B9	--	--	--	--	--	--	--	--	--	--	--	--	--	33.6	--
B1515BZ	--	--	--	--	--	--	--	--	--	34.9	28.9	38.9	38.1	--	--
B1515BGD	--	--	--	--	--	--	--	--	--	38.0	58.0	--	--	--	--
B1515W	--	--	--	--	--	--	--	--	--	--	--	--	25.0	--	--
B1717B	--	--	--	--	--	--	29.5	--	--	--	--	--	--	--	--
C1414C	--	--	--	12.9	17.4	22.8	30.8	32.2	34.3	37.6	39.2	40.8	42.1	41.9	--
C1414A	--	--	--	--	--	--	--	--	35.7	37.0	38.6	36.6	39.9	36.4	27.9
C1414W	--	--	--	--	--	--	--	22.1	33.8	33.7	32.3	31.3	33.6	32.3	--
C1616CSD	--	--	--	--	--	--	13.6	26.9	21.0	25.8	33.4	39.4	41.2	43.7	--
C8016C	--	--	--	--	--	--	--	--	--	17.1	21.1	32.9	38.1	37.0	18.0
W1414W	--	7.7	17.6	24.4	26.6	31.0	32.1	34.3	35.2	30.5	--	39.5	40.0	43.0	--
W1414WL	--	--	18.4	24.3	27.2	32.9	34.3	35.5	36.2	36.4	40.0	43.0	--	--	--
W1414WO	--	--	--	--	--	--	--	19.4	40.7	36.0	39.6	39.7	42.7	44.3	--
W1414A	--	--	--	--	25.3	--	28.6	36.2	35.2	37.2	35.9	36.9	37.3	37.9	--
W1414ATR	--	--	--	--	--	--	--	--	37.6	38.0	38.5	45.0	44.0	--	--
W1414B	--	--	--	--	24.4	--	--	--	--	--	--	--	--	--	--
W1515W	--	--	--	19.3	21.2	30.7	29.0	33.1	35.2	35.5	37.2	39.2	--	--	16.4
W1515WL	--	--	15.9	21.1	24.3	30.2	31.5	33.3	32.9	35.0	35.4	36.4	41.0	39.0	--
W1515WO	--	--	--	--	--	--	--	--	18.3	32.1	36.0	35.6	37.3	40.3	--
W1515A	--	--	--	--	--	30.3	31.6	31.4	30.6	32.6	35.7	38.0	39.7	--	--
W1515APL	--	--	--	--	--	--	--	--	--	--	--	--	22.0	--	--
W1717WL	--	--	--	--	16.1	17.0	28.0	25.2	28.4	29.6	32.8	34.6	36.4	40.1	13.4
W1717WO	--	--	--	--	--	--	--	--	36.1	20.4	30.2	34.1	38.6	33.0	--
W1717WV5	--	--	--	--	--	--	--	--	--	--	46.0	38.2	39.6	41.7	--
W1717WV+	--	--	--	--	--	--	--	--	--	--	--	--	--	41.7	--
W1717WVH	--	--	--	--	--	--	--	--	--	--	--	35.3	37.0	41.2	--
W1717A	--	--	--	--	--	--	--	--	--	37.0	38.6	38.9	42.1	46.0	--
W1717B	--	--	--	--	--	--	--	--	--	--	--	42.0	19.7	35.7	--
WST17W	--	--	--	--	--	--	--	--	--	--	12.0	19.4	30.5	--	--
XFC14C	--	--	--	8.6	25.5	24.0	30.9	36.1	39.2	39.0	--	31.0	39.4	--	--
XFC14A	--	--	--	--	--	--	--	--	34.8	36.3	38.9	41.0	38.0	--	--
XHN15W	--	22.5	29.3	32.8	31.2	--	--	--	--	--	--	--	--	--	--
XHN15MS	--	--	28.3	--	--	--	--	--	--	--	--	--	--	--	--
XHN15MZ	--	--	25.6	--	--	--	--	--	--	--	--	--	--	--	--

Table B10. Burnup of Spent Fuel Assemblies, by Type, Discharged by Year (Continued)
(Gigawattdays thermal per metric ton of uranium)

Assembly Type Code	1968- 1969	1970- 1971	1972- 1973	1974- 1975	1976- 1977	1978- 1979	1980- 1981	1982- 1983	1984- 1985	1986- 1987	1988- 1989	1990- 1991	1992- 1993	1994 ^a	Temps ^b
Pressurized-Water Reactors (PWR)															
XHN15HS	--	--	--	32.2	--	--	--	--	--	--	--	--	--	--	--
XHN15HZ	--	--	18.5	--	--	--	--	--	--	--	--	--	--	--	--
XHN15B	--	--	--	--	33.5	32.7	33.8	33.8	35.2	33.9	32.0	34.3	33.2	--	--
XIP14W	--	--	25.2	13.8	--	--	--	--	--	--	--	--	--	--	--
XPA15C	--	--	--	11.3	--	26.7	30.3	--	--	--	--	--	--	--	--
XPA15A	--	--	--	--	--	20.2	35.3	33.3	34.8	--	35.0	36.7	33.2	--	23.5
XSL16C	--	--	--	--	--	--	--	--	12.6	29.5	39.1	39.8	43.6	44.3	--
XSO14W	--	21.7	29.0	28.9	31.9	31.9	30.5	--	29.7	--	34.9	30.0	21.7	--	--
XYR18W	--	--	23.9	27.0	--	--	--	--	--	--	--	--	--	--	--
XYR16U	--	--	--	26.9	28.2	--	--	--	--	--	--	--	--	--	--
XYR16A	--	--	--	--	--	27.3	29.9	29.0	28.5	31.0	--	--	--	--	--
XYR16C	--	--	--	--	--	--	--	--	--	--	32.0	21.6	--	--	--

^aSome data for previous years have been revised. Current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change. See Technical Note 12 in Appendix E.

^bTemps are temporarily discharged assemblies, as of December 31, 1994, as reported on Form RW-859.

-- = Not applicable.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Pictograms Showing Reactor Storage Pool Configurations, Pool Capacities, and Inventories at Nuclear Power Plant Sites and Storage Facilities

The pool site pictograms contained in this appendix graphically compare the maximum storage capacity of each spent fuel storage pool site with its inventory as of December 31, 1994. (A pool site is a configuration of pools having a single cask loading area.) EIA defines maximum established spent fuel capacity for the site as the number of intact assemblies that will be able to be stored at some point in the future (between the reporting date and the reactor's end of life) considering any established or current studies or engineering evaluations, at the time of submittal for licensing approval from the U.S. Nuclear Regulatory Commission. (See Technical Note 9 in Appendix E).

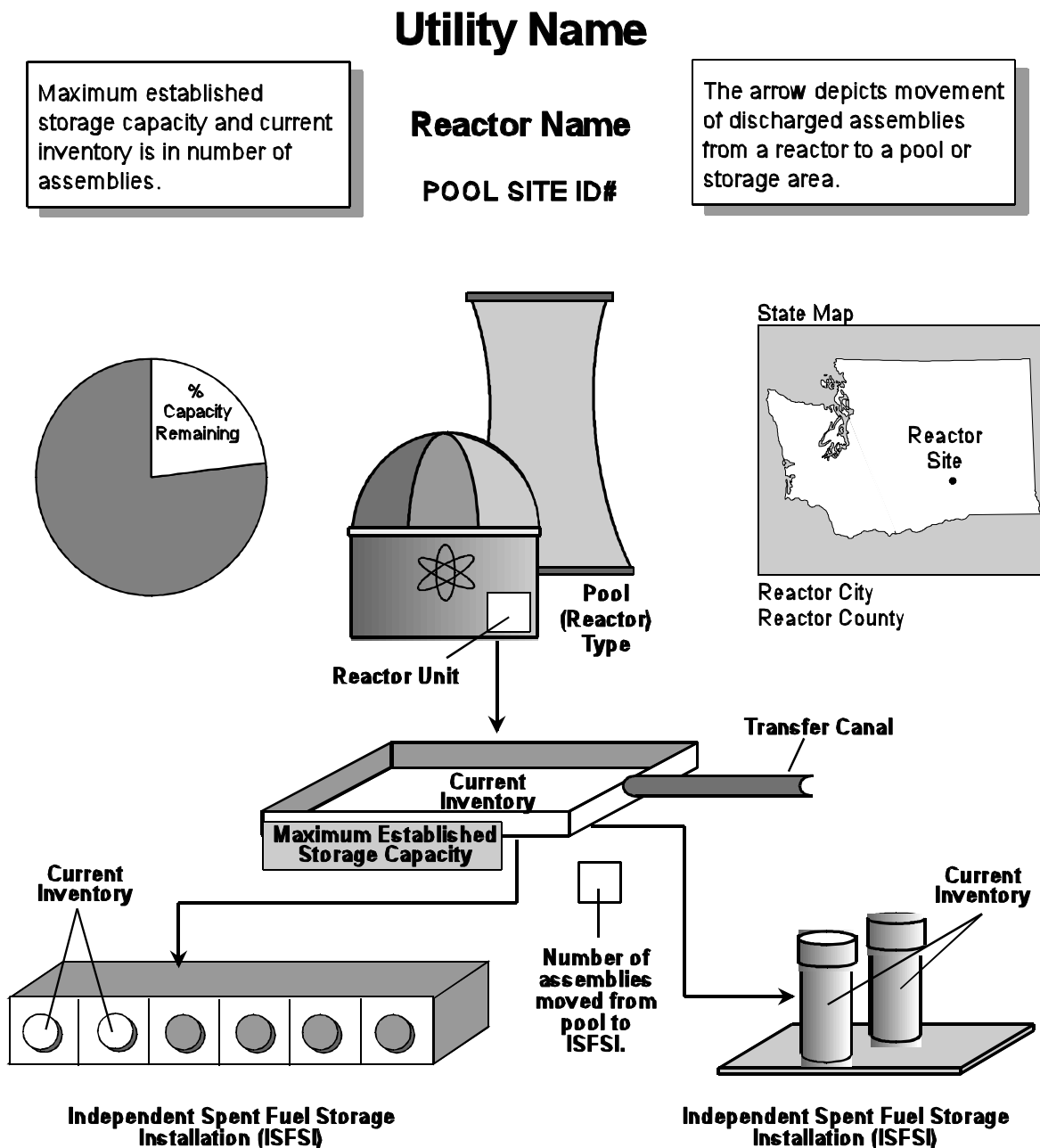
The pictograms are ordered by utility and highlight the various reactor/pool site configurations, such as the absence or presence of transfer canals, multiple pools servicing single reactors, and reactors sharing one pool site. Multiple storage pools linked by transfer canals have one pool site ID number because they share a common cask loading dock. In the pictograms, temporarily discharged assemblies are included in the present inventory totals. The movement of fuel between the storage pools and the Independent Spent Fuel Storage Installations (ISFSI's) at an individual site is represented by arrows. Two different designs of ISFSI's are also shown. Additional information on the ISFSI's is reported in Chapter 2.

Legend

In Appendix C the pictograms show selected data from Tables 10 and 11. Data in the pictograms include Utility and Reactor Names, Pool Site ID Number, Maximum Established Storage Capacity, and Current Inventory.

Each pictogram illustrates reactor/pool site configurations, such as the absence or presence of transfer canals, multiple pools servicing single reactors, and reactors sharing one

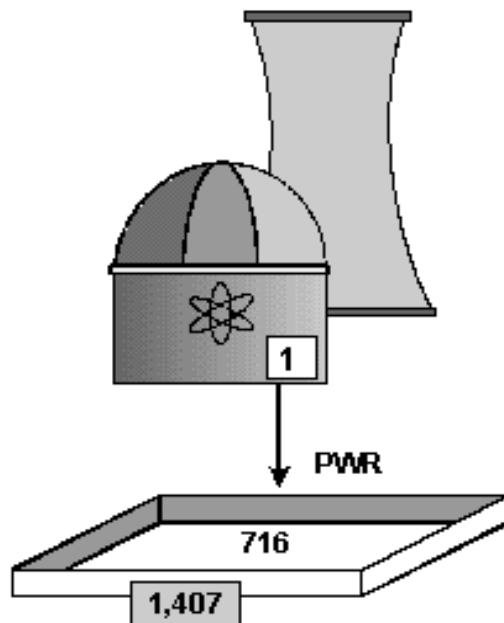
pool site. Multiple storage pools linked by transfer canals have one pool site ID number. The location of each reactor is identified on a state map that includes the city and county of each reactor site. Two different designs of Independent Spent Fuel Storage Installations (ISFSI's) are depicted. A pie chart indicating the reactor's percentage of pool storage capacity remaining is shown in each pictogram. (Note: dry storage inventories are not included in the pie chart.)



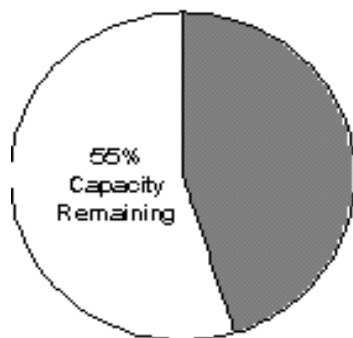
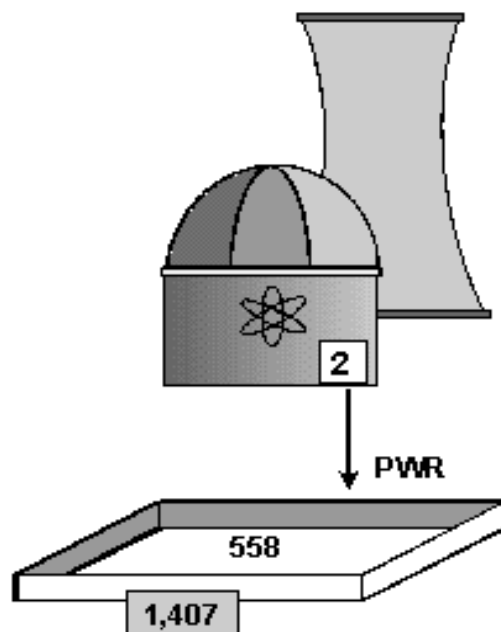
Alabama Power Company

Farley

POOL SITE #0101



POOL SITE #0102



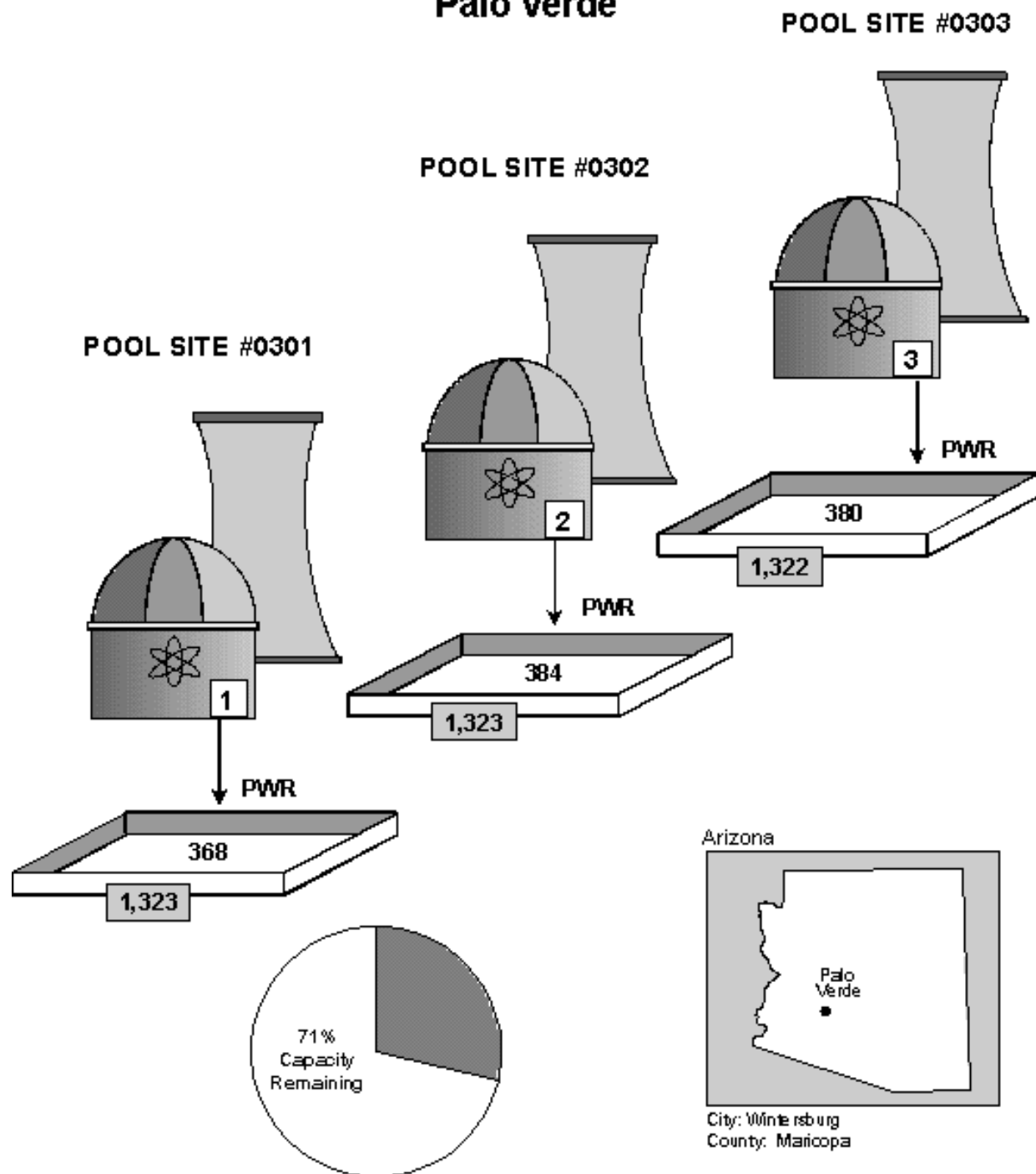
Alabama



City: Dothan
County: Houston

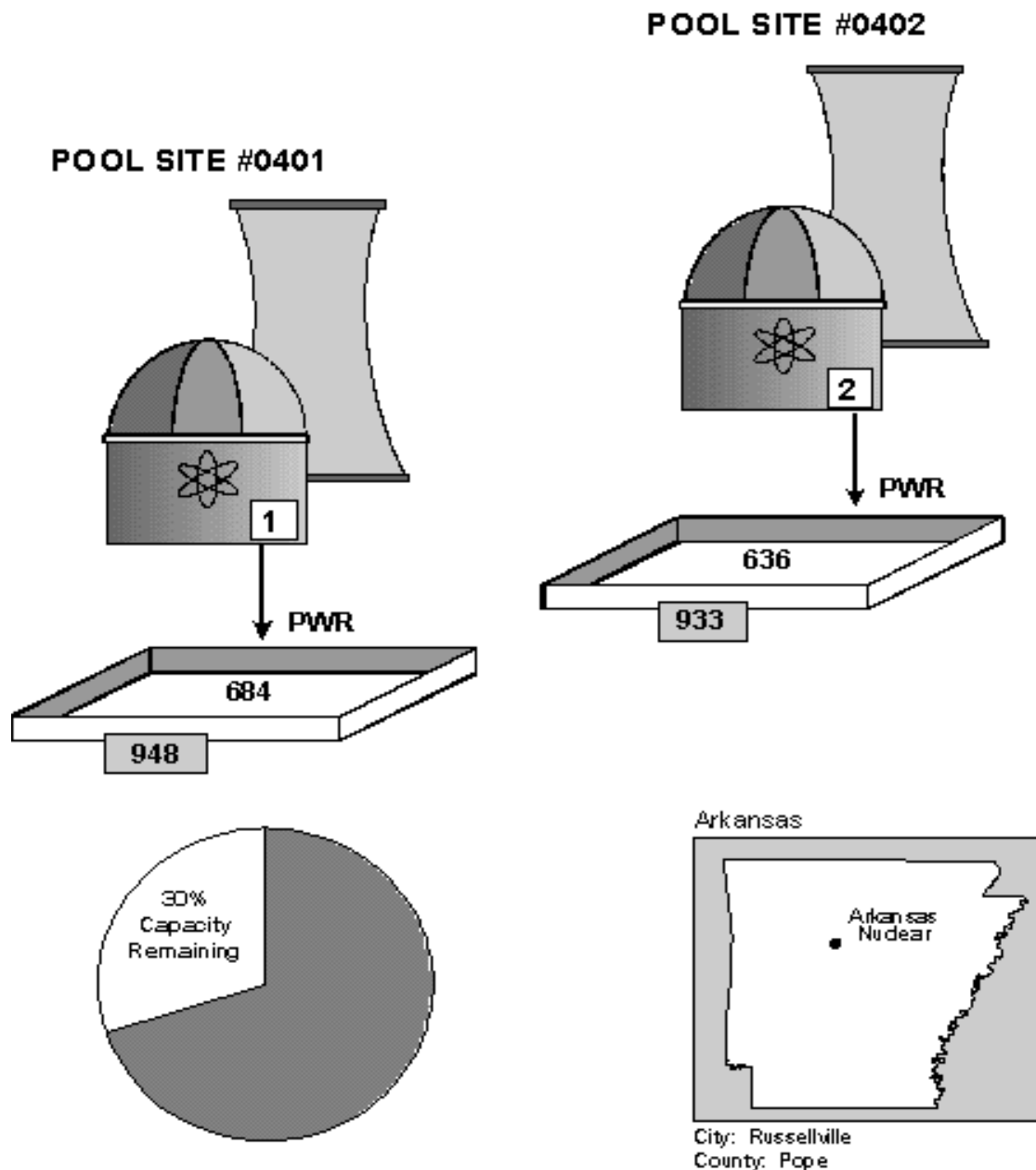
Arizona Public Service Company

Palo Verde

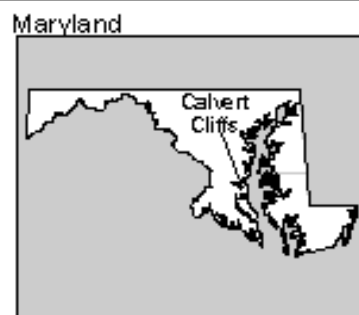
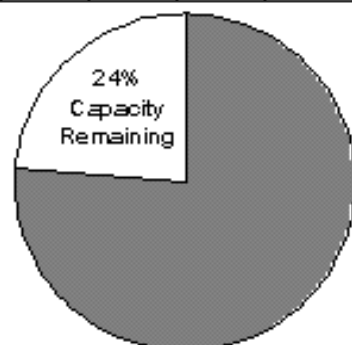
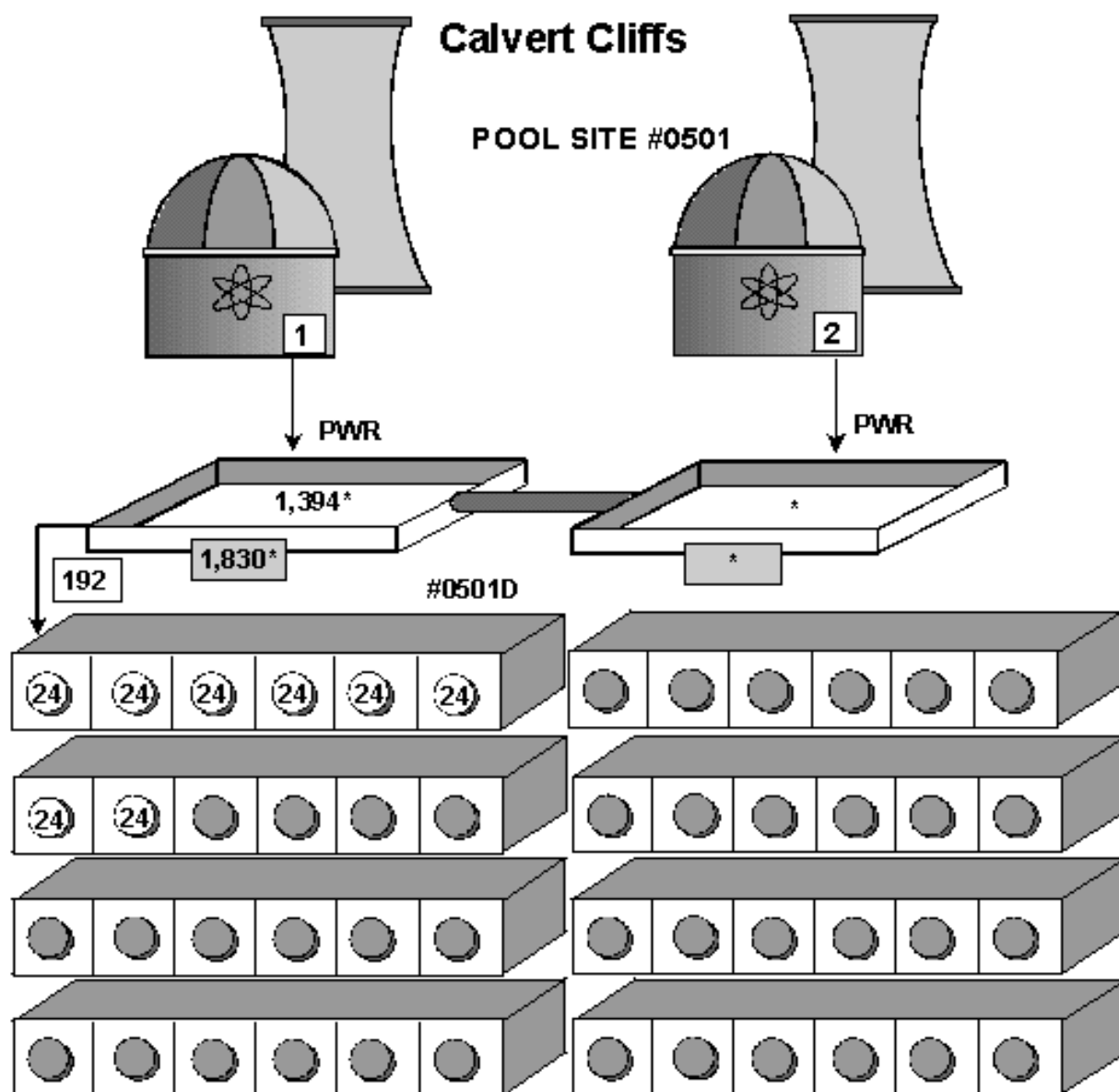


Arkansas Power and Light Company

Arkansas Nuclear



Baltimore Gas and Electric Company



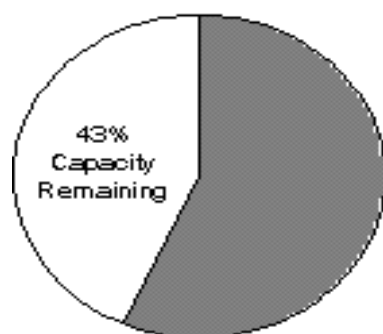
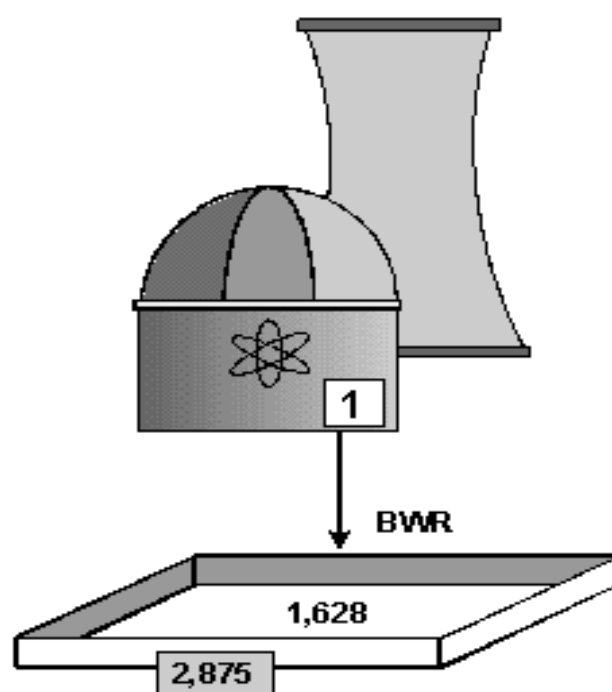
City: Lusby
County: Calvert

* Data are presented as single pool

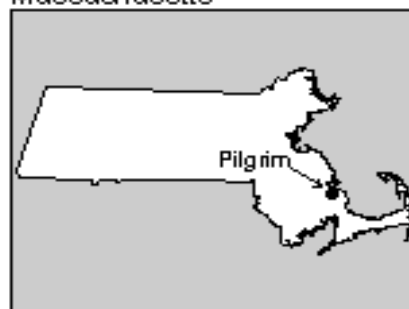
Boston Edison Company

Pilgrim

POOL SITE #0601



Massachusetts

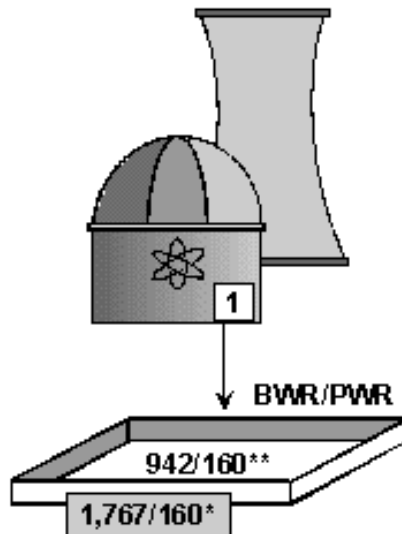


City: Plymouth
County: Plymouth

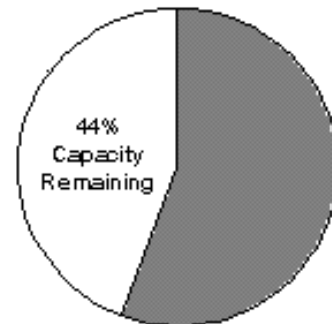
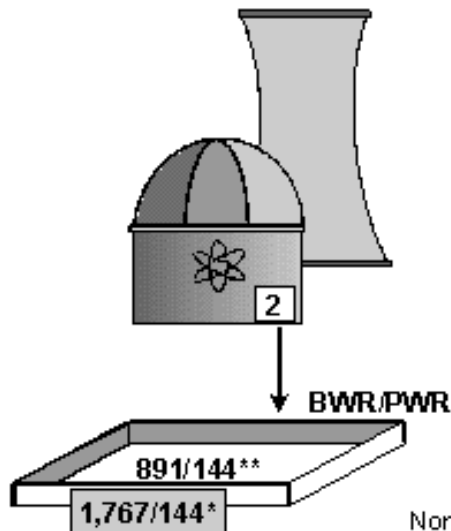
Carolina Power and Light Company

Brunswick

POOL SITE #0701

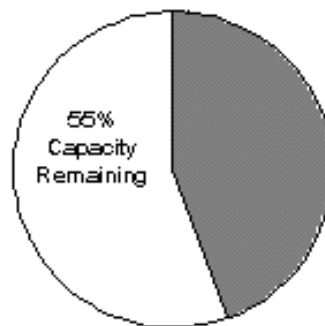
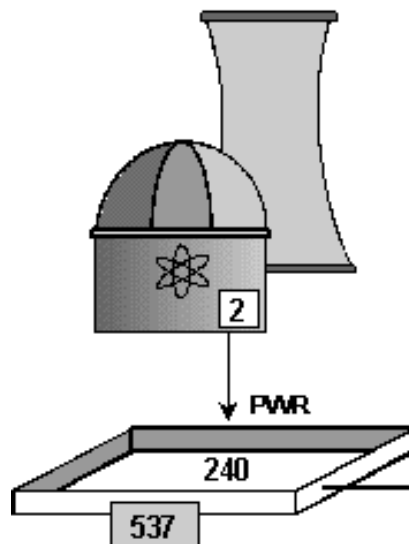


POOL SITE #0702



Robinson

POOL SITE #0705



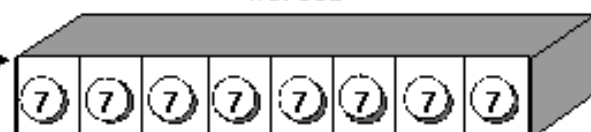
North Carolina/
South Carolina



Brunswick (NC)
City: Southport
County: Brunswick

Robinson (SC)
City: Hartsville
County: Darlington

#0705D



* The first number in the ratio denotes the maximum established storage capacity for assemblies in the BWR portion of the Brunswick pools. The second number is the maximum established storage capacity for assemblies in the PWR portion of the Brunswick pools.

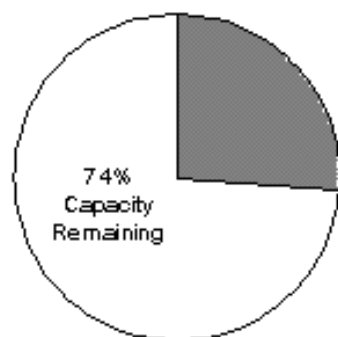
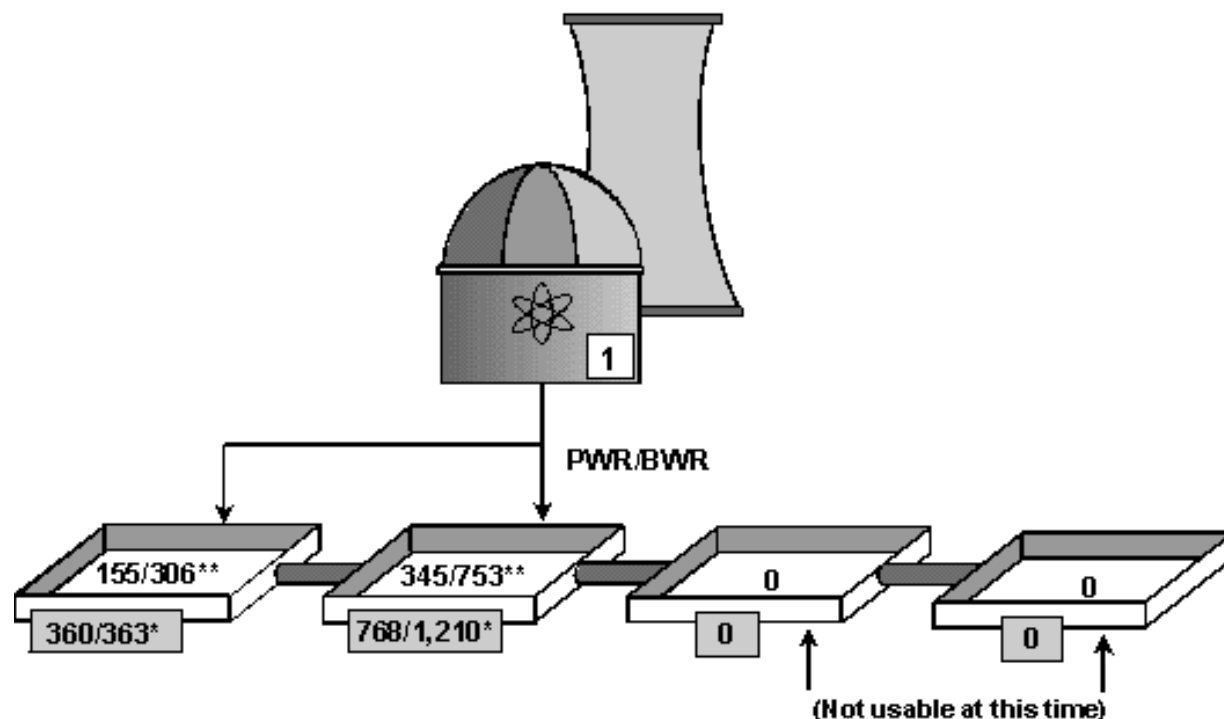
** The first number in the ratio denotes the current inventory of assemblies stored in the BWR portion of the Brunswick pools. The second number is the current inventory of assemblies stored in the PWR portion of the Brunswick pools.

Carolina Power and Light Company

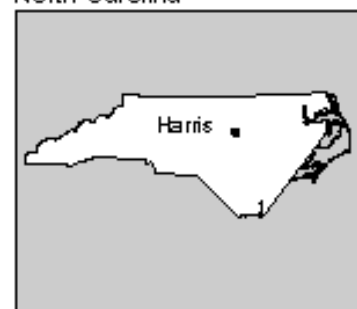
(Continued)

Harris

POOL SITE #0703



North Carolina



City: New Hill
County: Wake

* The first number in the ratio denotes the maximum established storage capacity for assemblies in the PWR portion of the Harris pools. The second number is the maximum established storage capacity for assemblies in the BWR portion of the Harris pools.

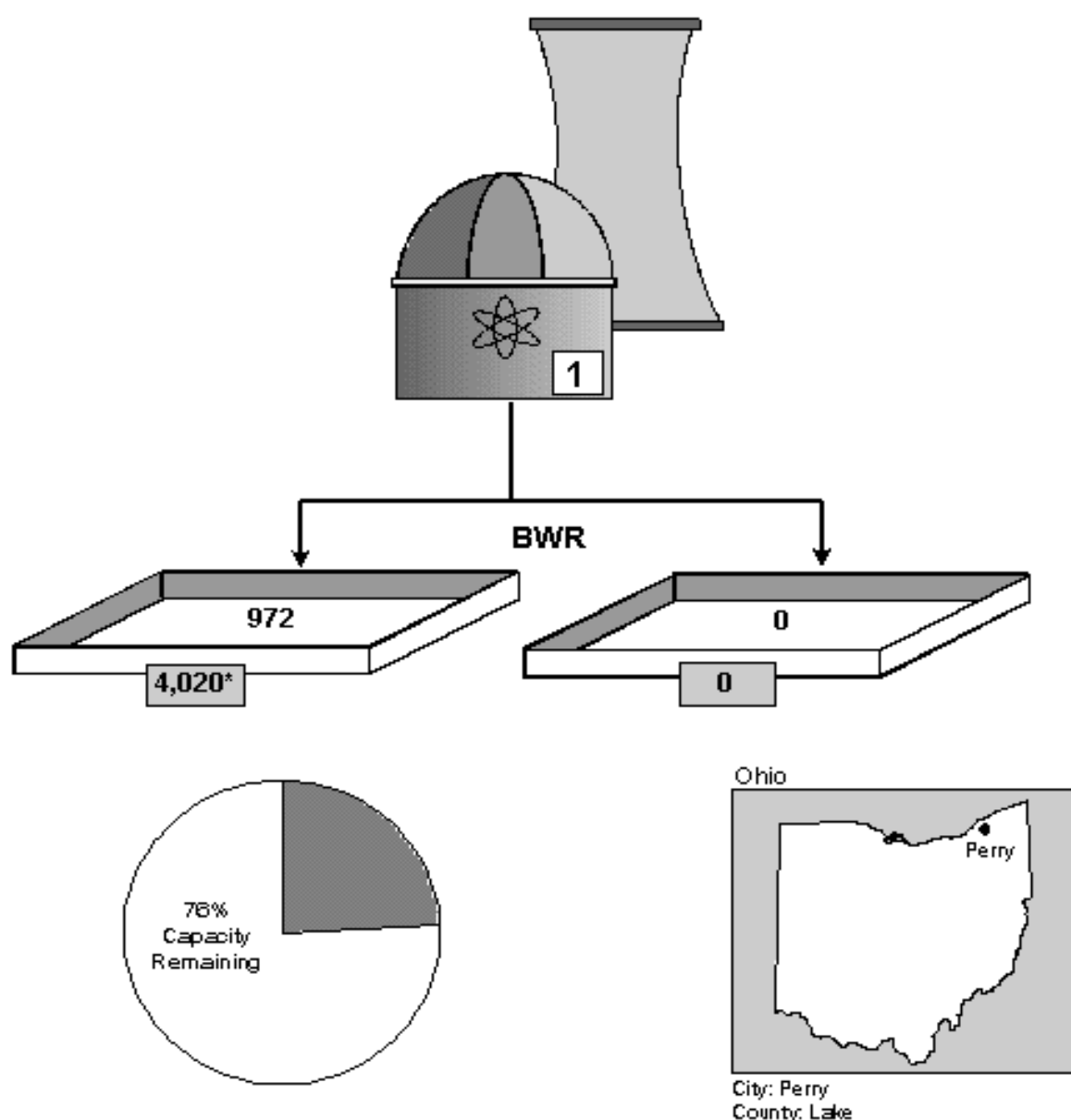
** The first number in the ratio denotes the current inventory of assemblies stored in the PWR portion of the Harris pool. The second number is the current inventory of assemblies stored in the BWR portion of the Harris pool.

Notes: The Harris pools are licensed to hold up to 4,184 PWR or 5,808 BWR assemblies or a combination of each. In addition to the capacities shown, 704 PWR and 968 BWR racks are available as needed from site storage. These capacities reflect the maximum storage until additional storage racks are purchased.

Cleveland Electric Illuminating Company

Perry

POOL SITE #0901 and #0902

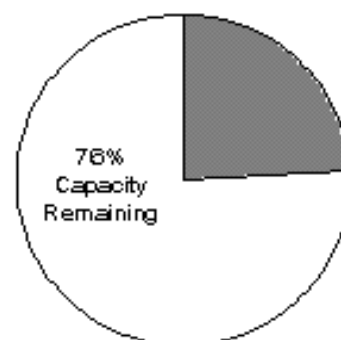
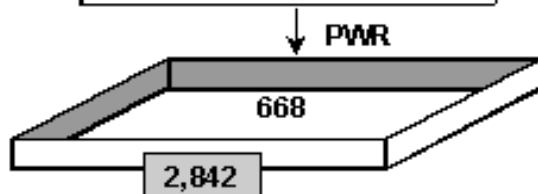
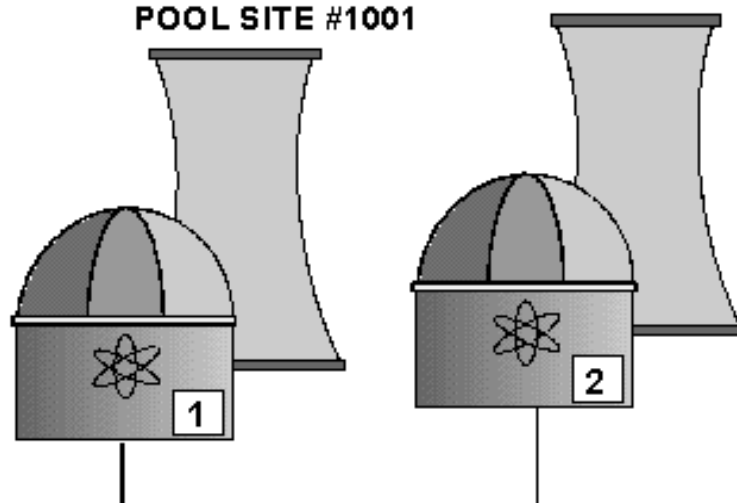


*Previously reported for separate pools.

Commonwealth Edison Company

Braidwood

POOL SITE #1001



Illinois

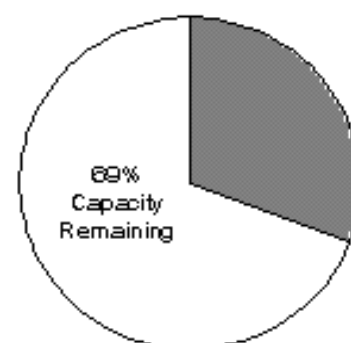
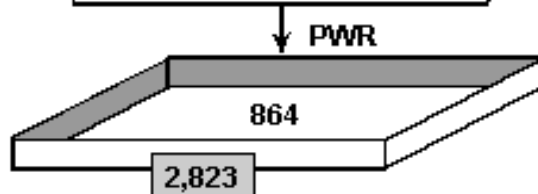
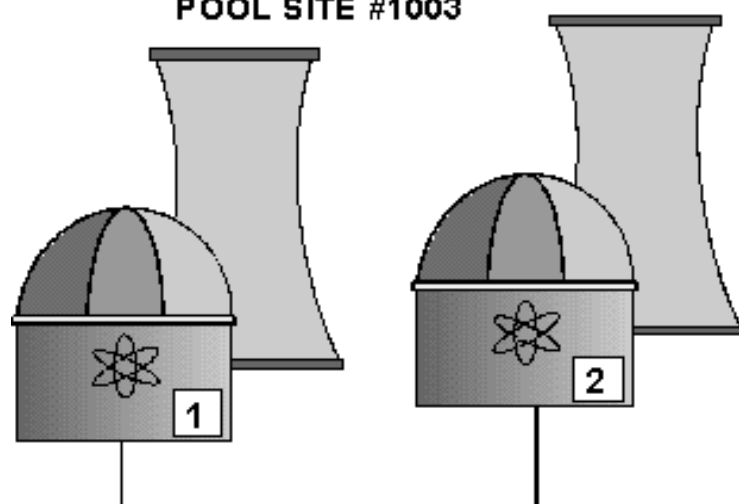


Braidwood
City: Braidwood
County: Will

Byron
City: Byron
County: Ogle

Byron

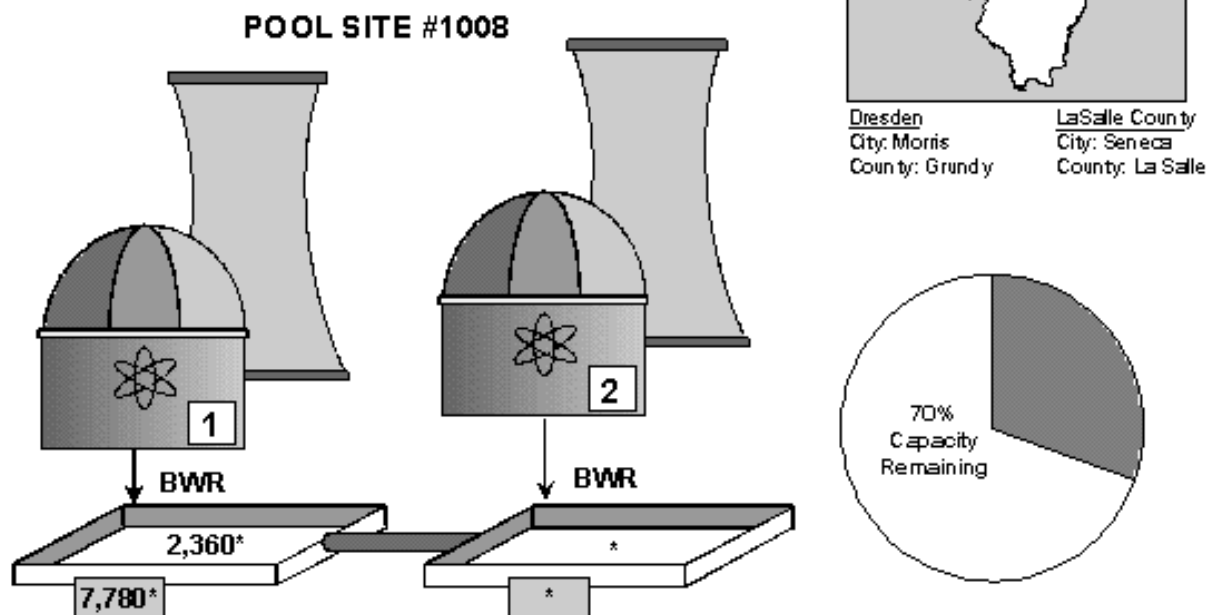
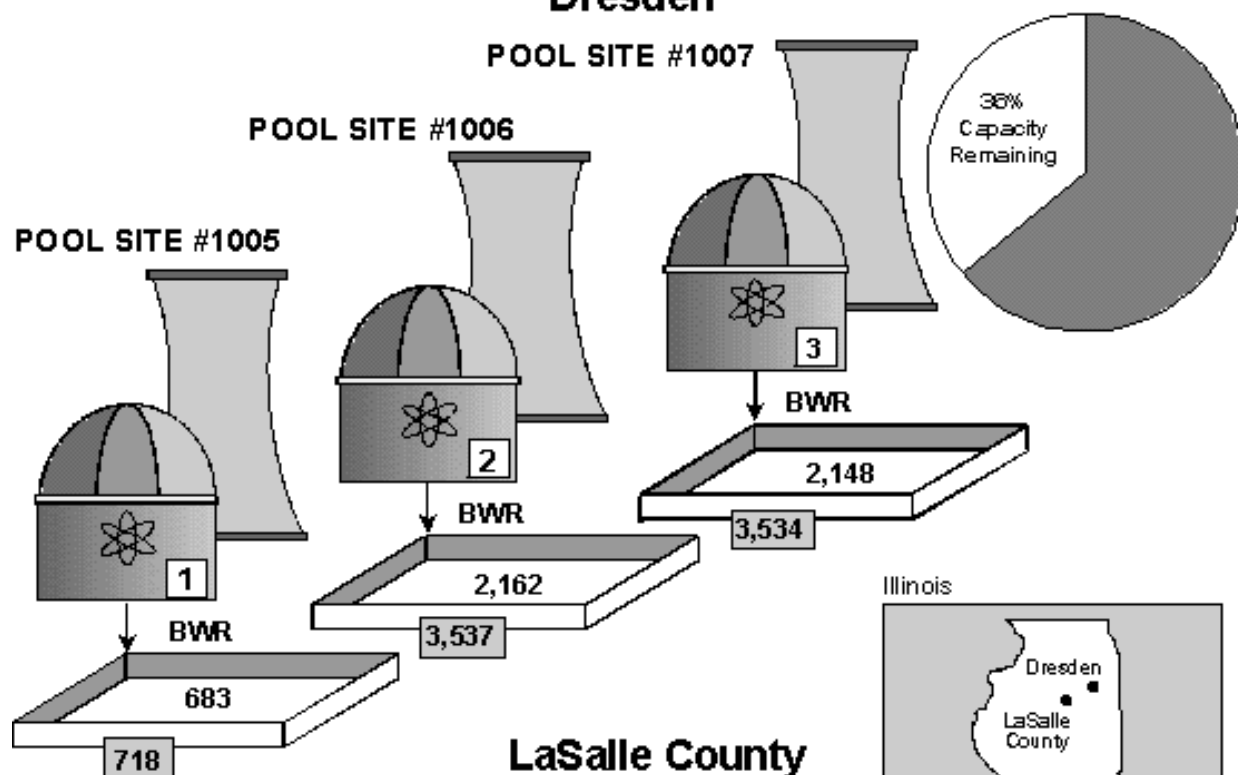
POOL SITE #1003



Commonwealth Edison Company

(Continued)

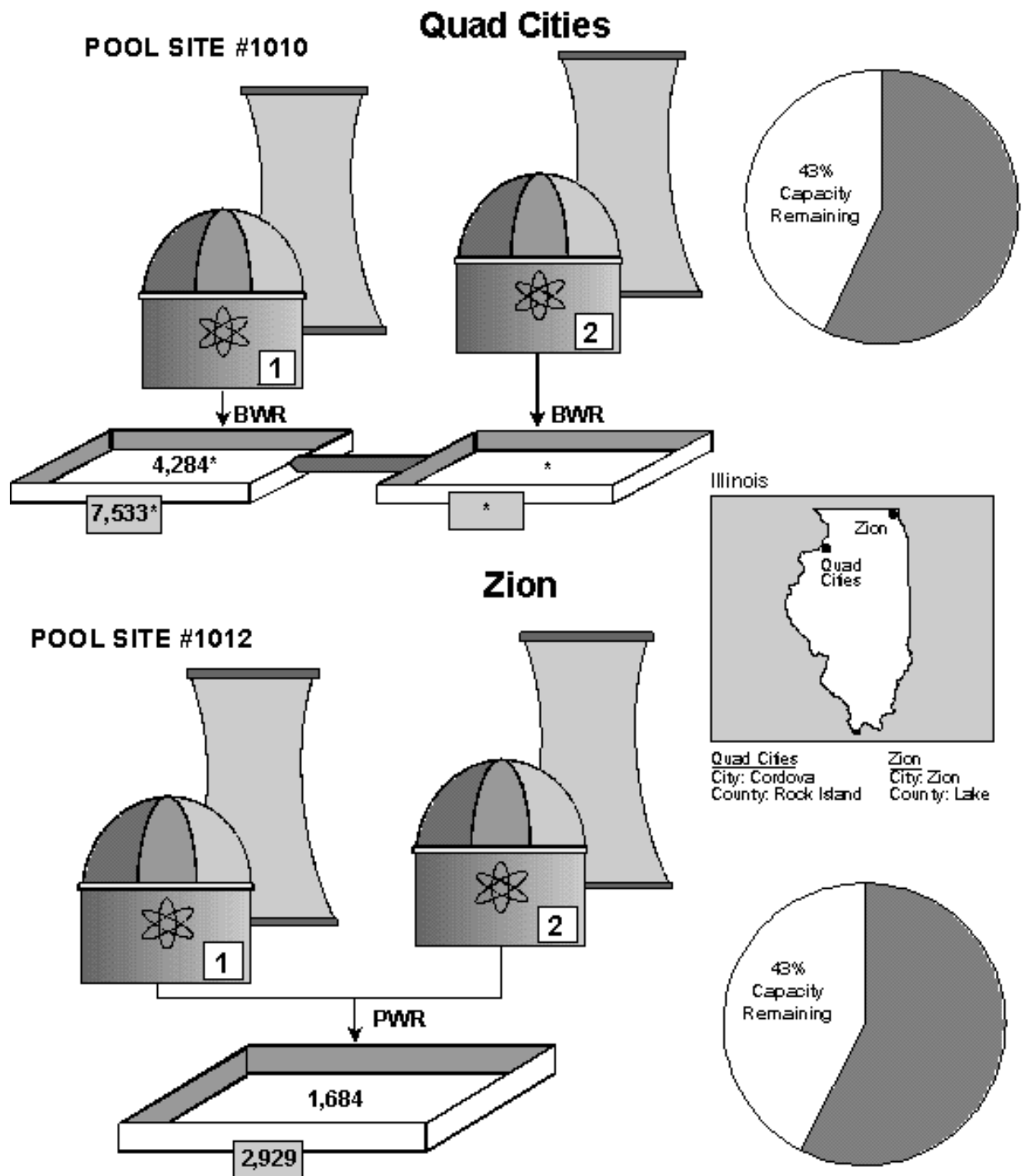
Dresden



* Data are presented as single pool.

Commonwealth Edison Company

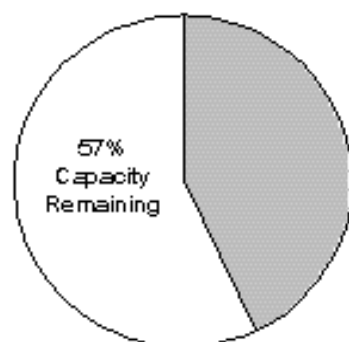
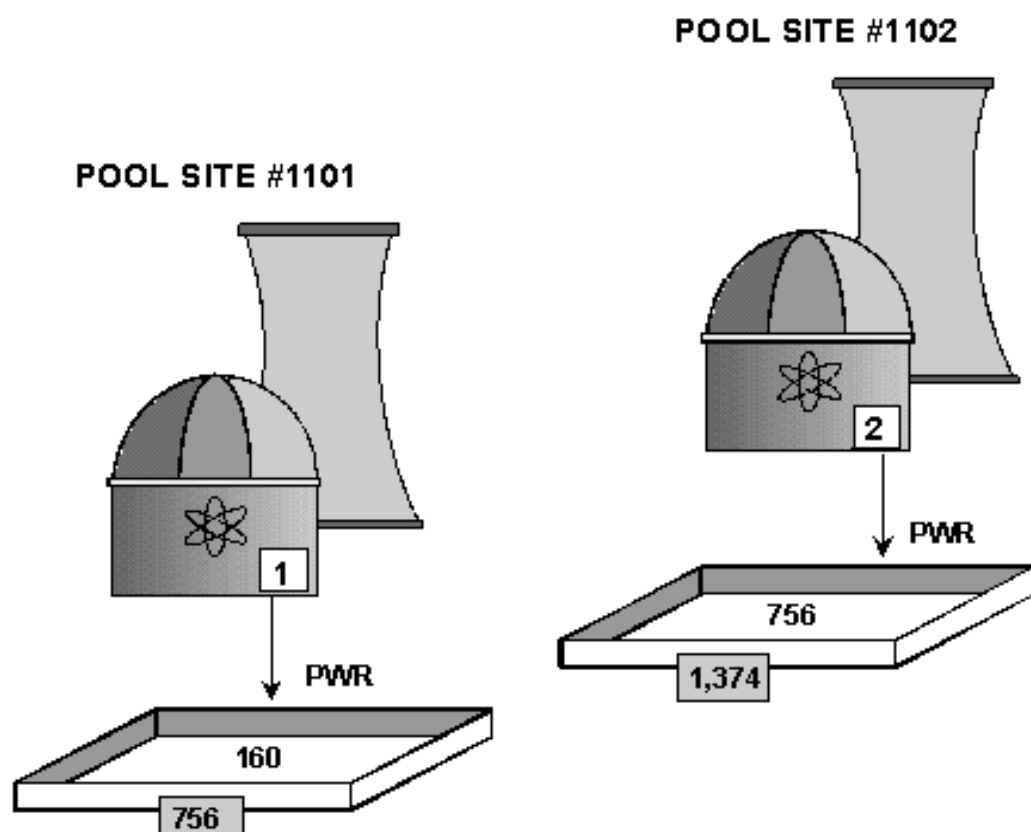
(Continued)



* Data are presented as single pool

Consolidated Edison Company of New York

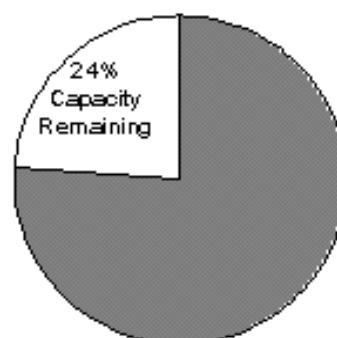
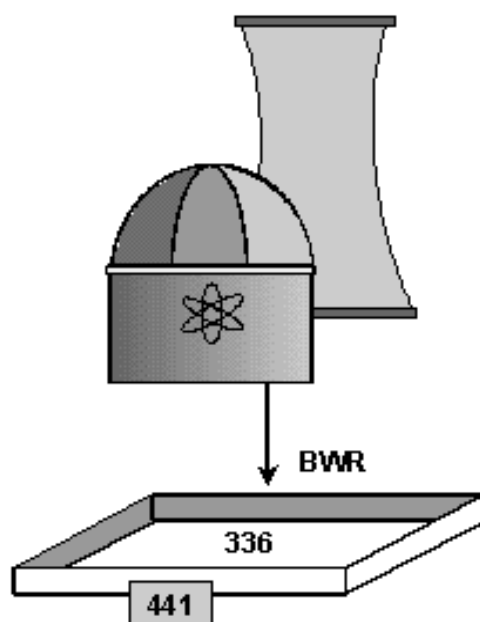
Indian Point



Consumers Power Company

Big Rock Point

POOL SITE #1201



Michigan



Big Rock Point

City: Charlevoix

County: Charlevoix

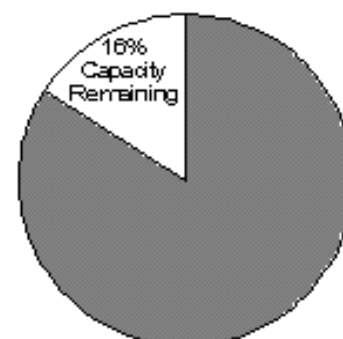
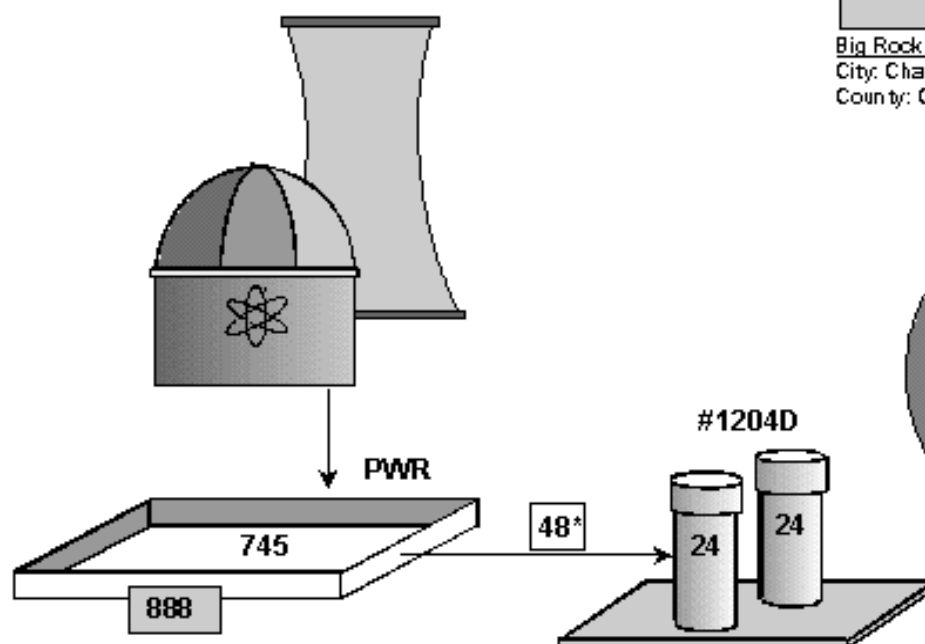
Palisades

City: South Haven

County: Van Buren

Palisades

POOL SITE #1204

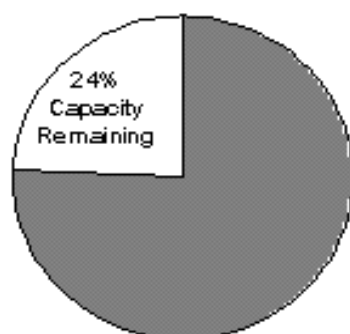
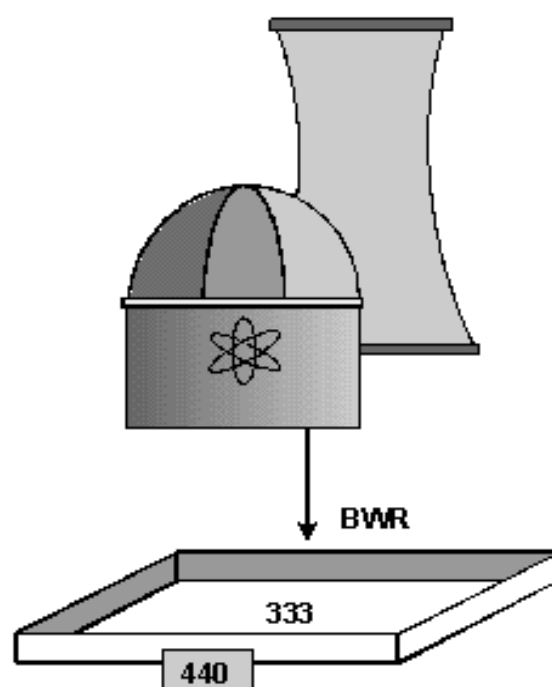


* Palisades did not have a discharge in 1994 and therefore, was not required to report on the Form RW-859 (See Appendix A). Because of this, the number of assemblies in Palisades' ISFSI reflects the inventory as of December 31, 1993.

Dairyland Power Cooperative

LaCrosse

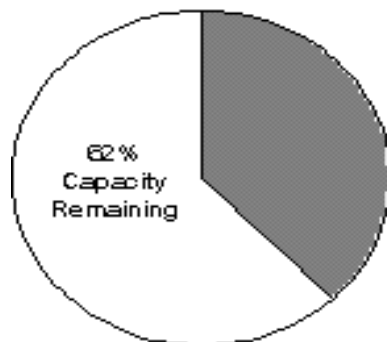
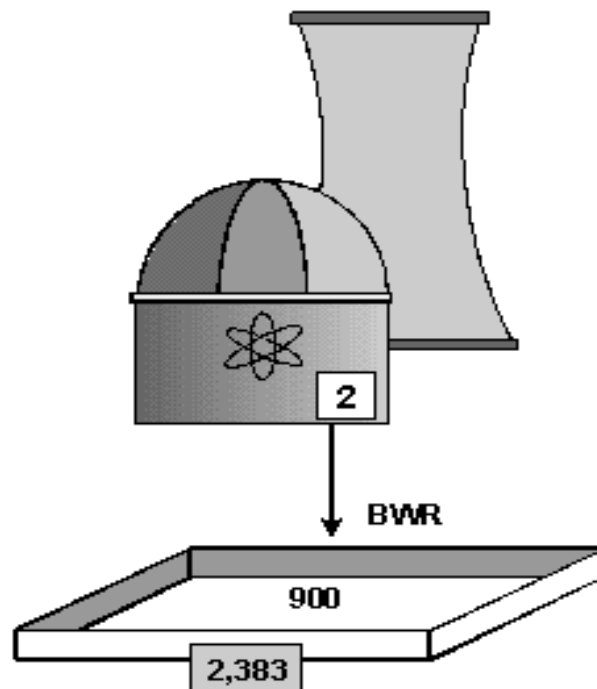
POOL SITE #1301



Detroit Edison Company

Enrico Fermi

POOL SITE #1402



Michigan



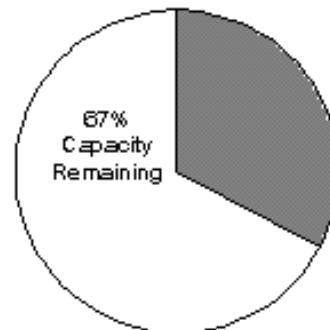
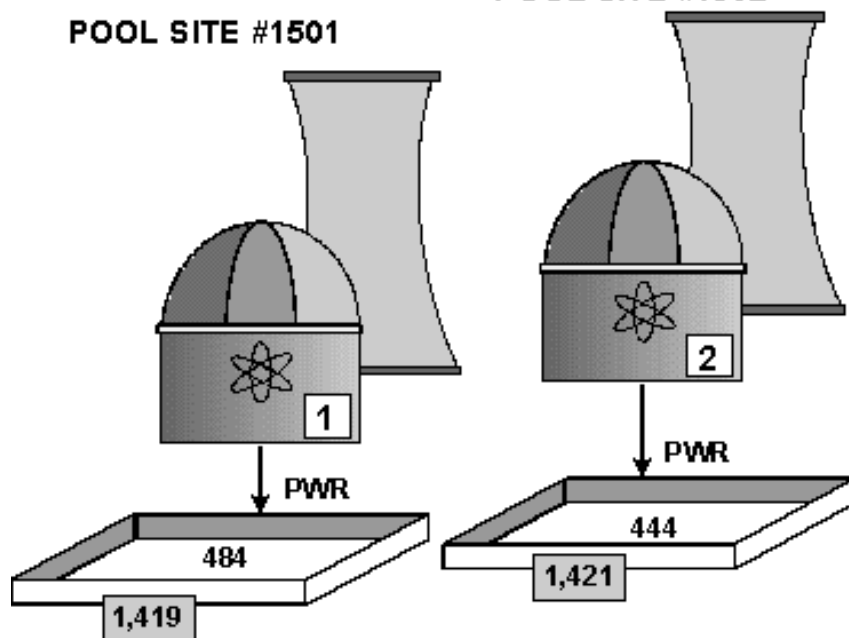
City: Newport
County: Monroe

Duke Power Company

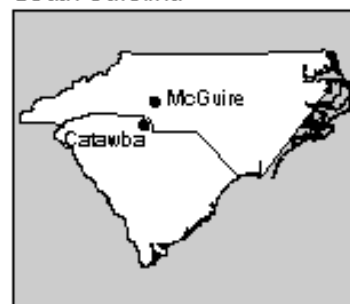
Catawba

POOL SITE #1502

POOL SITE #1501



North Carolina/
South Carolina



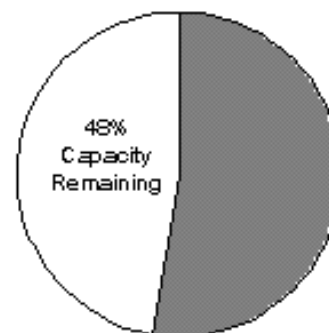
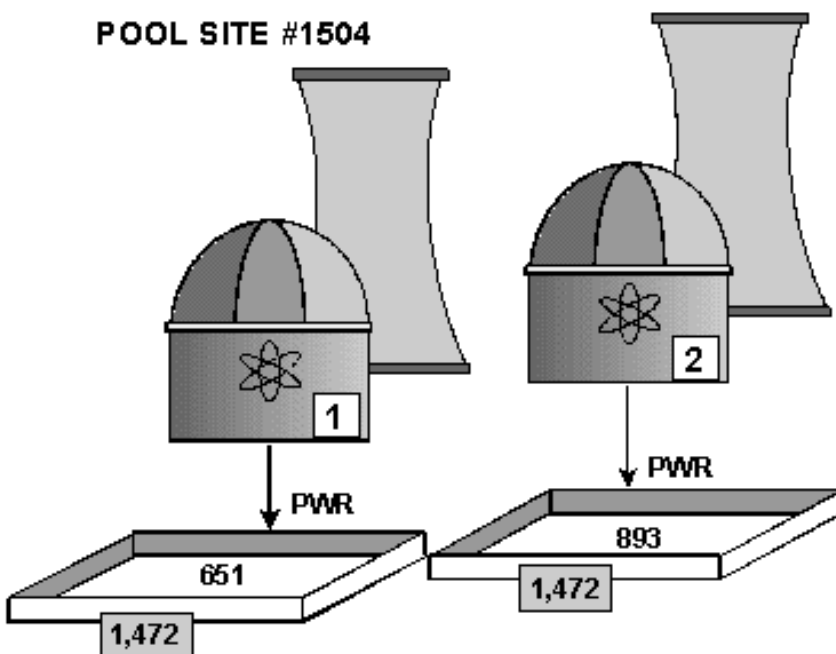
Catawba (SC)
City: Clover
County: York

McGuire (NC)
City: Cornelius
County: Mecklenburg

McGuire

POOL SITE #1505

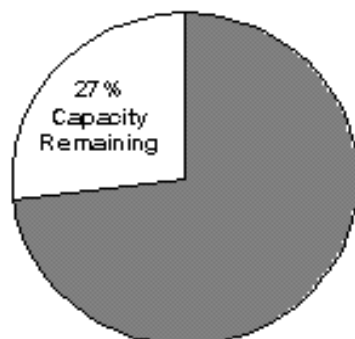
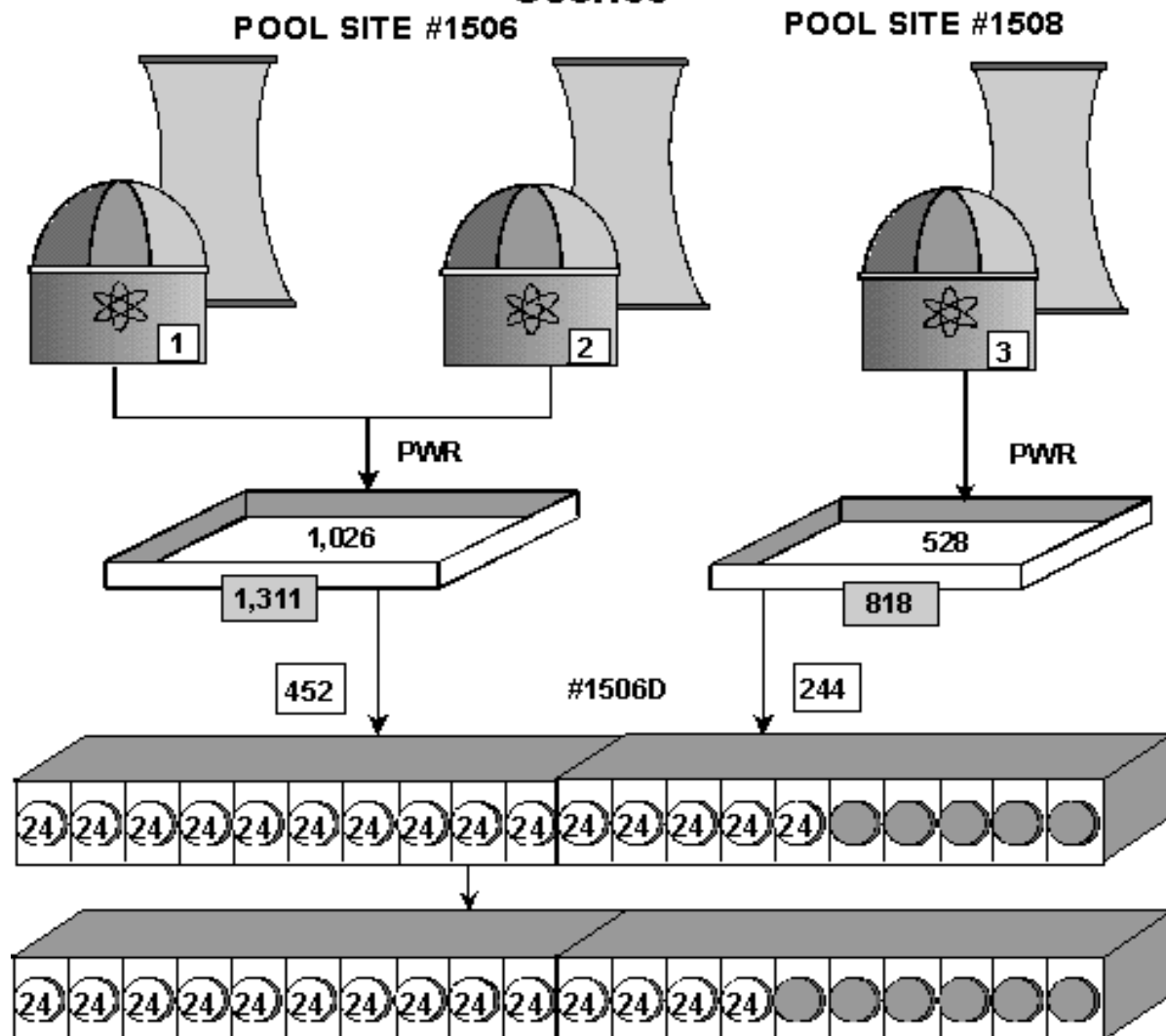
POOL SITE #1504



Duke Power Company

(Continued)

Oconee



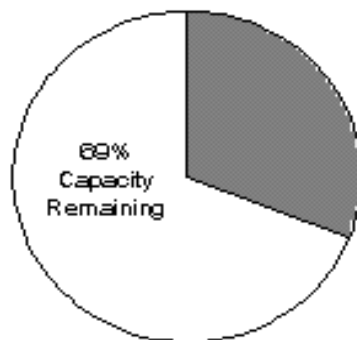
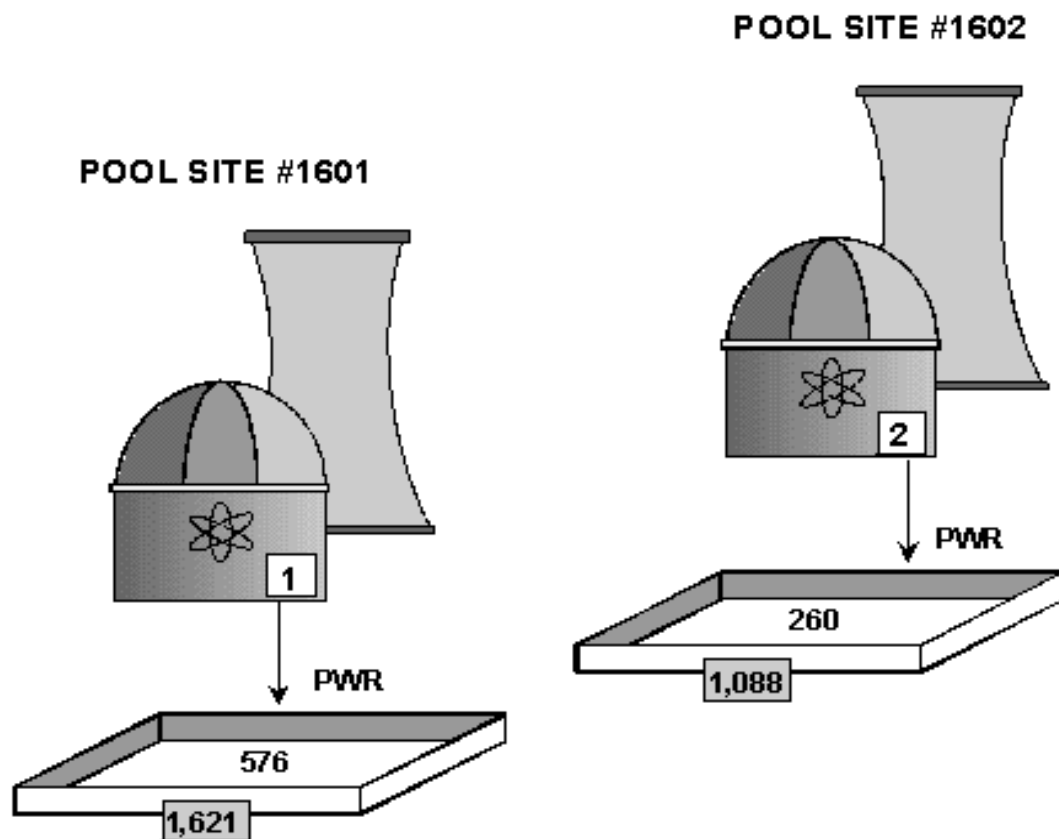
South Carolina



City: Seneca
County: Oconee

Duquesne Light Company

Beaver Valley



Pennsylvania

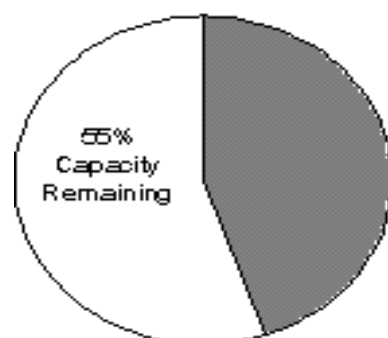
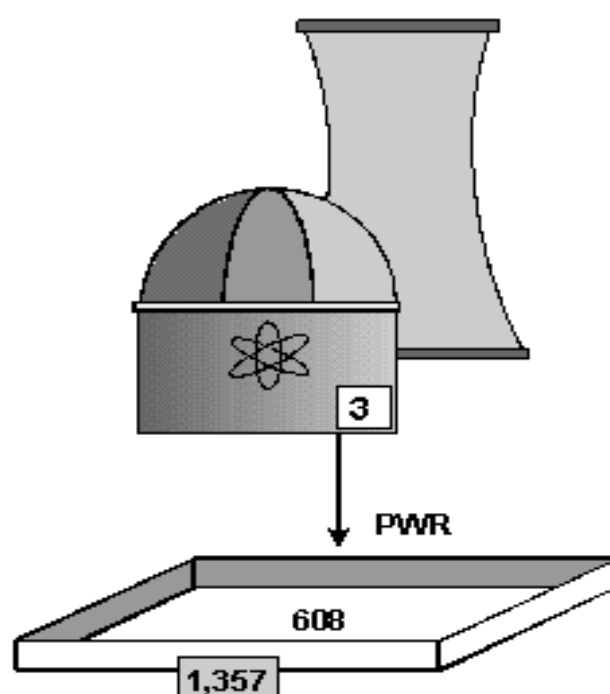


City: Shippingport
County: Beaver

Florida Power Corporation

Crystal River

POOL SITE #1701

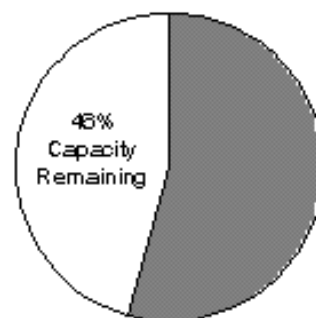
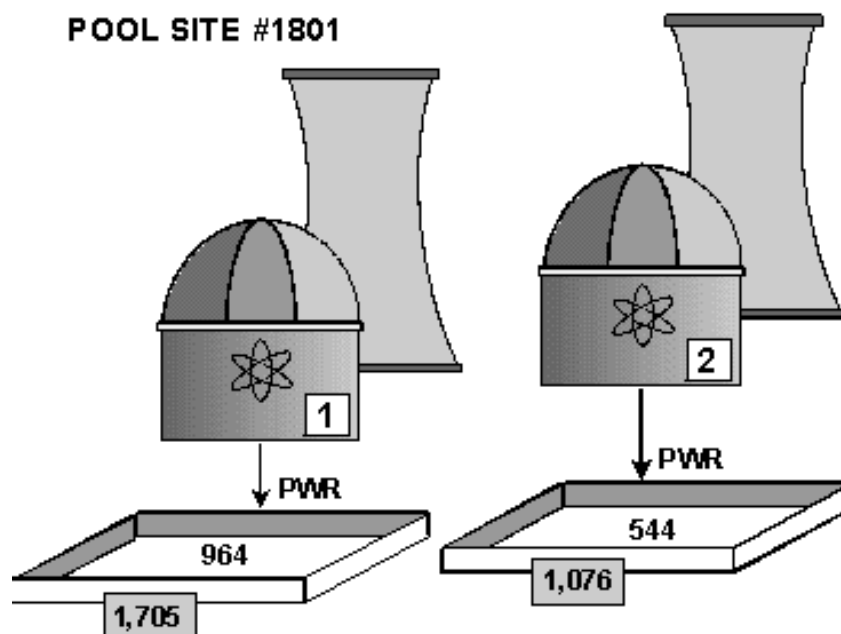


Florida Power and Light Company

St. Lucie

POOL SITE #1802

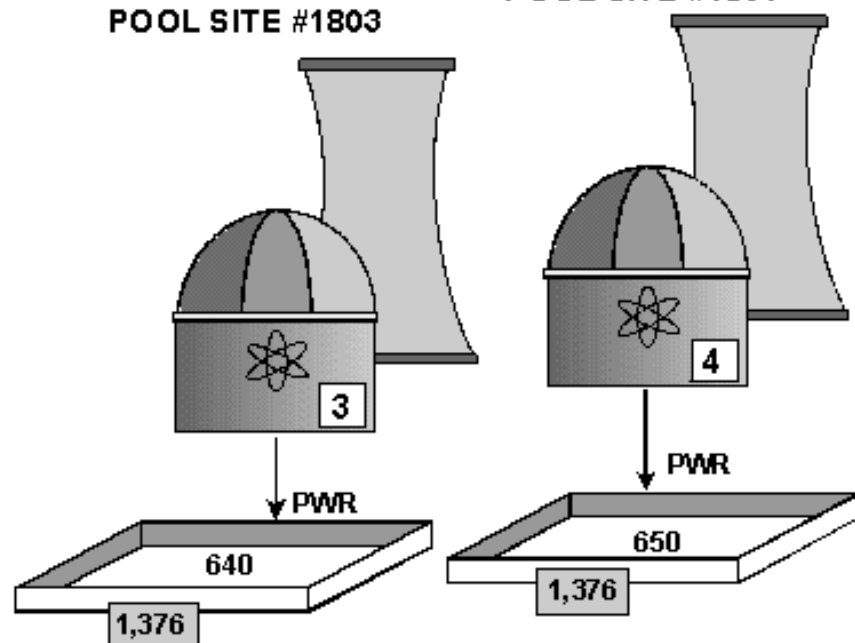
POOL SITE #1801



Turkey Point

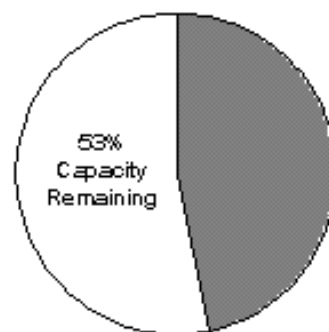
POOL SITE #1804

POOL SITE #1803

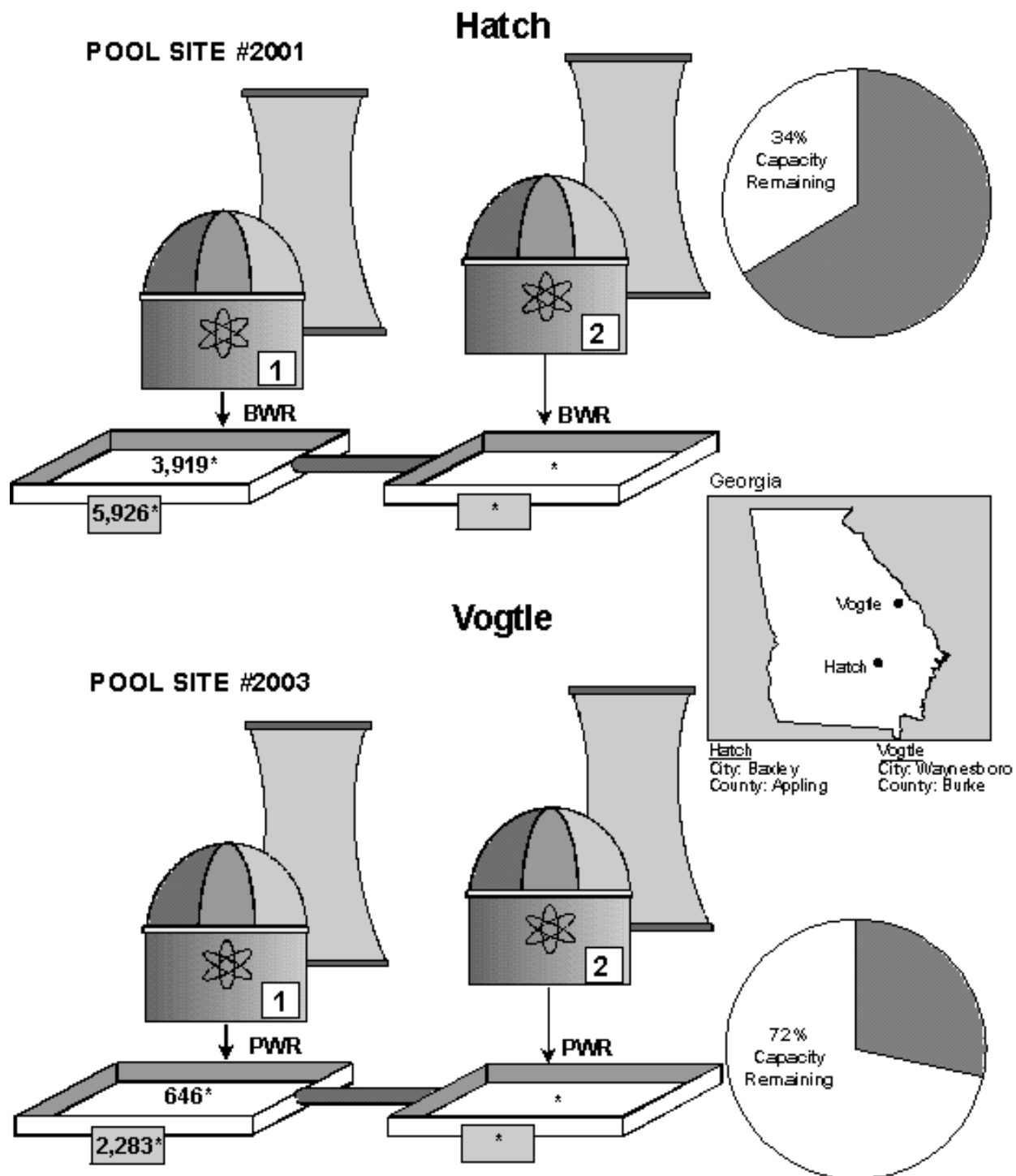


St. Lucie
City: Hutchinson Island
County: St. Lucie

Turkey Point
City: Florida City
County: Dade



Georgia Power Company

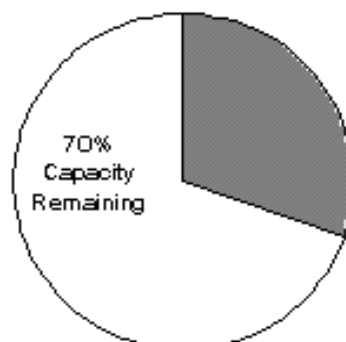
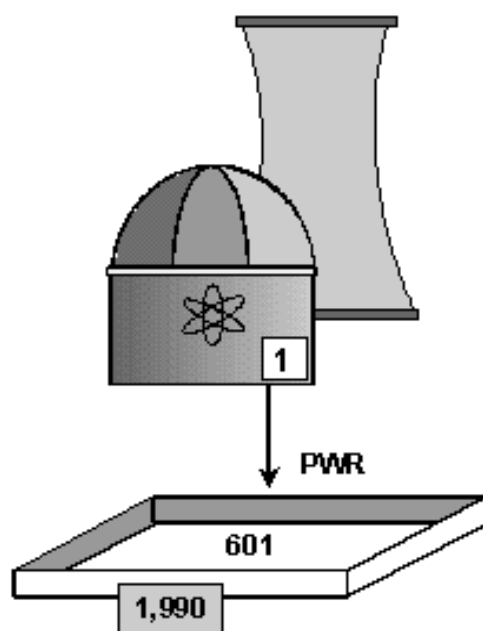


* Data are presented as single pool

GPU Nuclear Corporation

Three Mile Island

POOL SITE #1901



Pennsylvania/
New Jersey

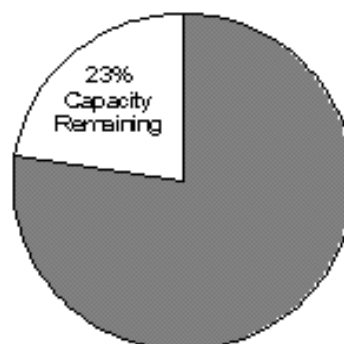
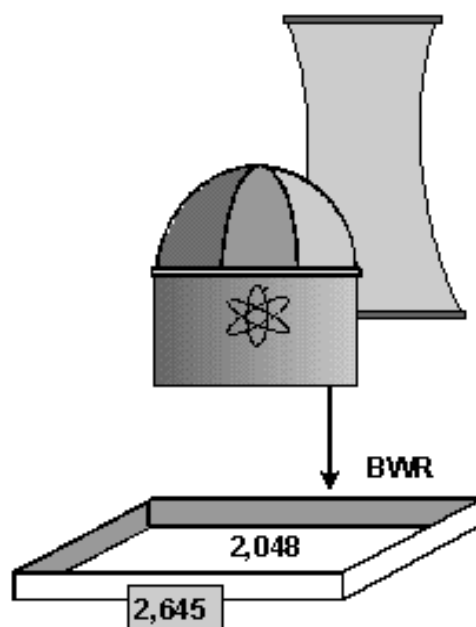


Three Mile Island (PA)
City: Middletown
County: Dauphin

Oyster Creek (NJ)
City: Forked River
County: Ocean

Oyster Creek

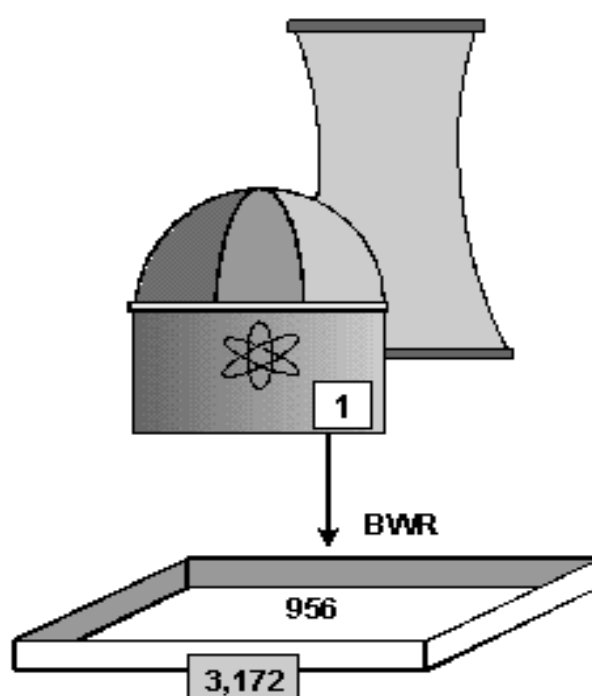
POOL SITE #1903



Gulf States Utilities Company

River Bend

POOL SITE #2101



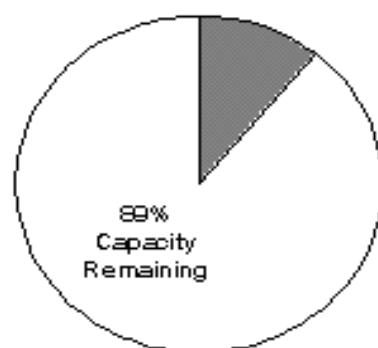
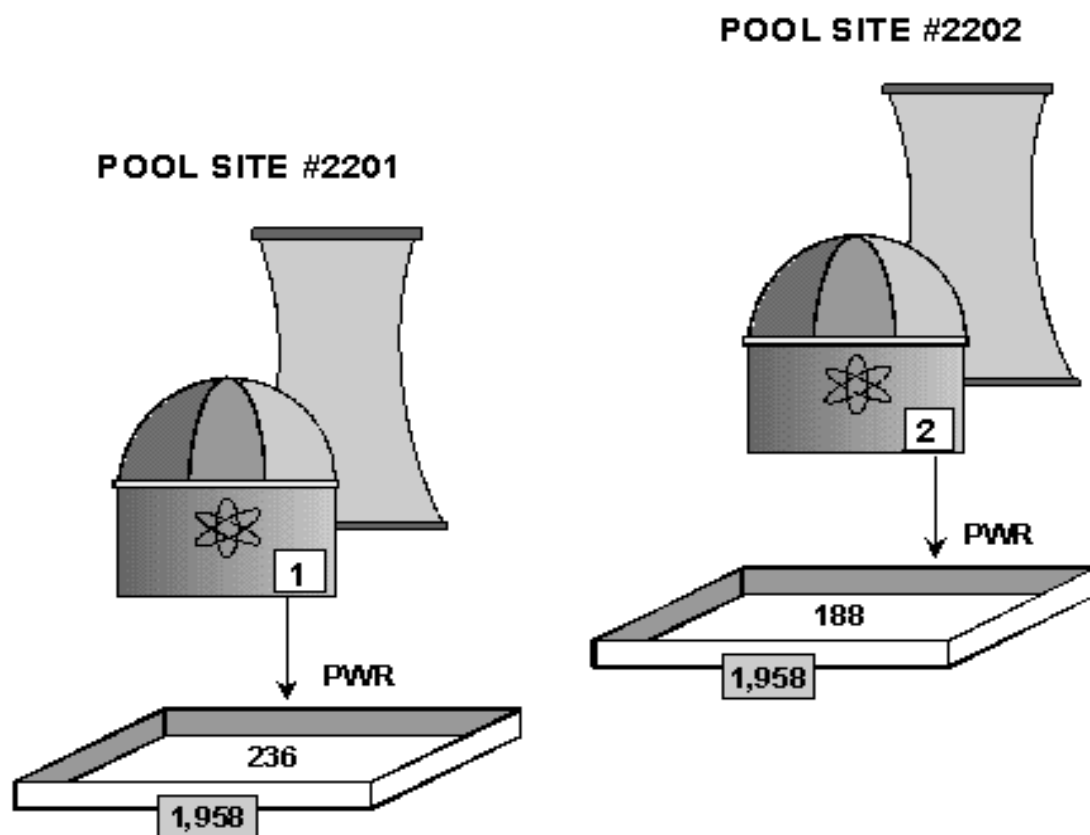
Louisiana



City: St. Francisville
County: West Feliciana

Houston Lighting and Power Company

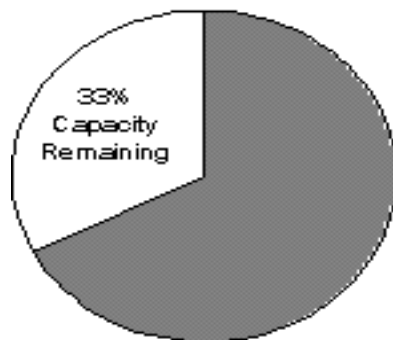
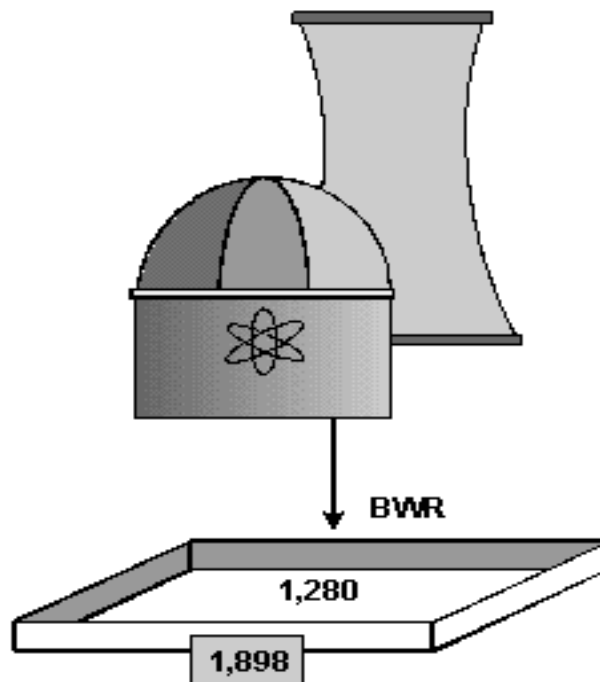
South Texas



IES Utilities, Inc.

Duane Arnold

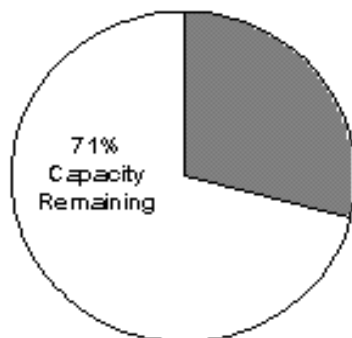
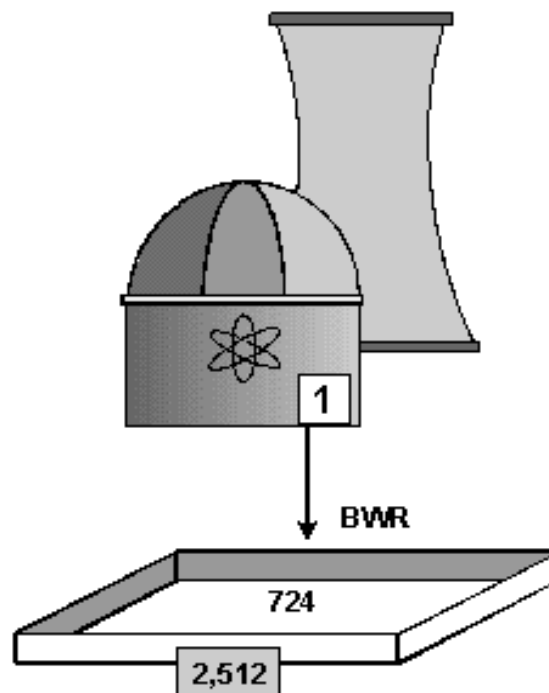
POOL SITE #2401



Illinois Power Company

Clinton

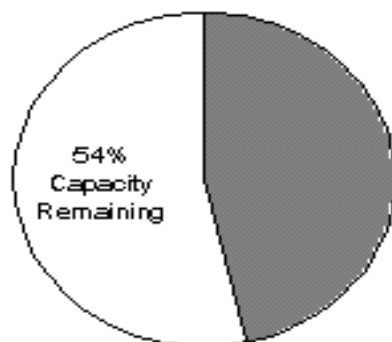
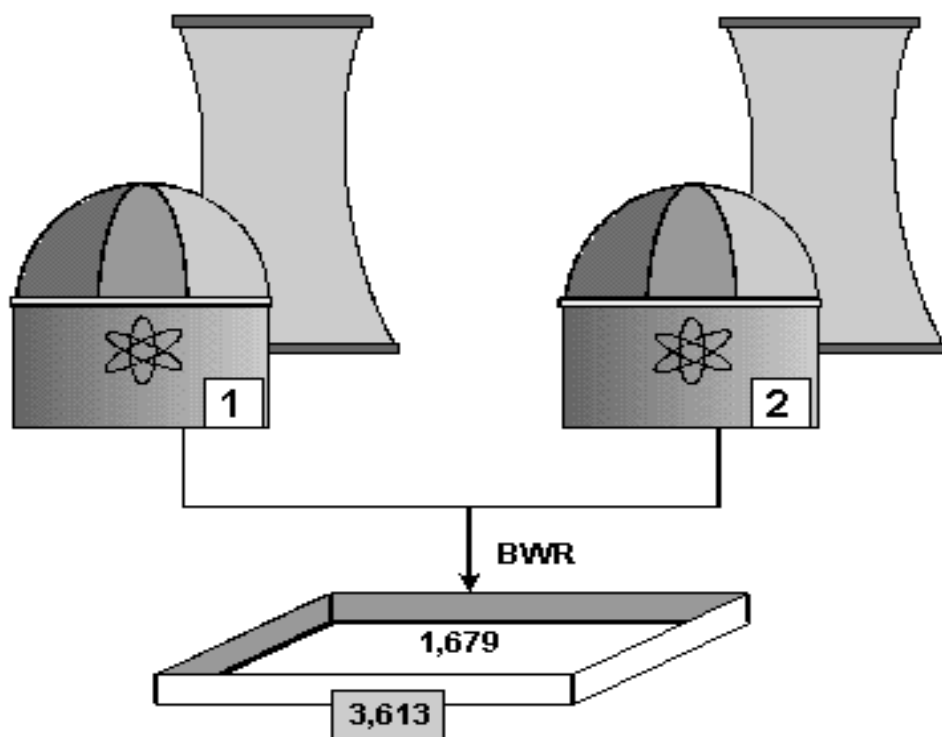
POOL SITE #2301



Indiana Michigan Power Company

Cook

POOL SITE #5801



Michigan

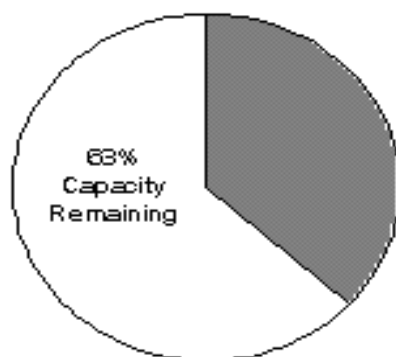
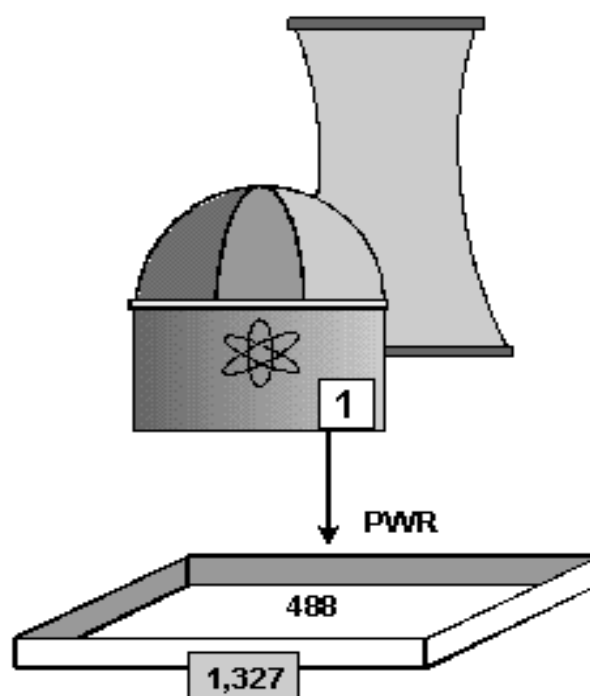


City: Bridgeman
County: Berrien

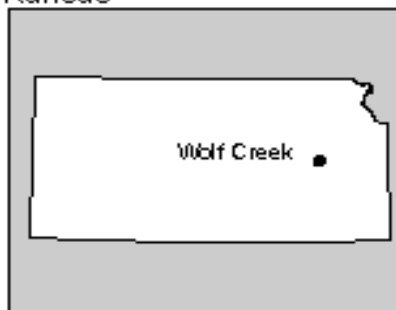
Kansas Gas and Electric Company

Wolf Creek

POOL SITE #2501



Kansas

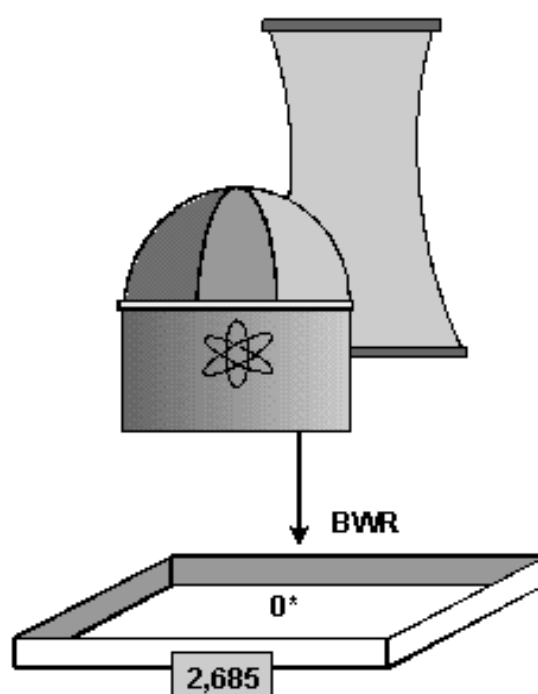


City: Burlington
County: Coffey

Long Island Power Authority

Shoreham

POOL SITE #2601



New York



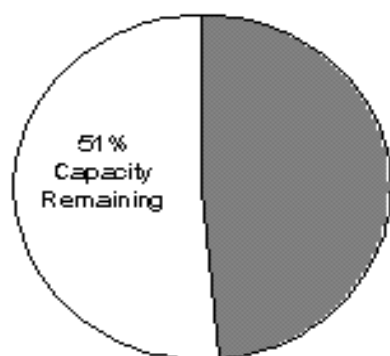
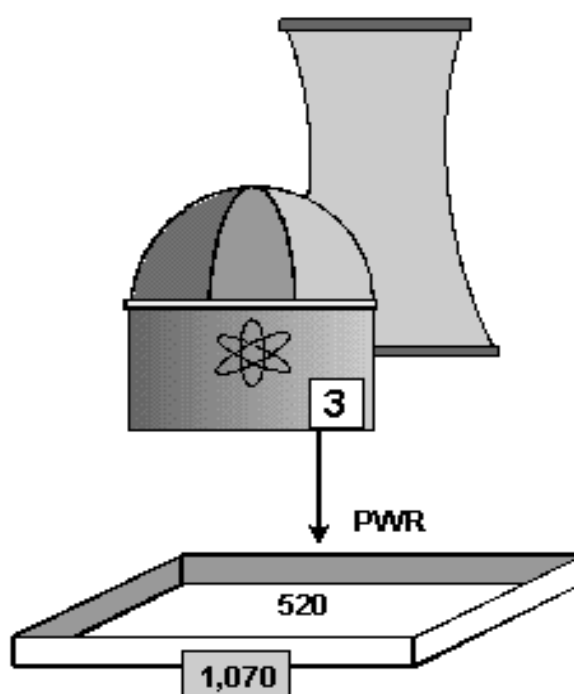
City: Brookhaven
County: Suffolk

* A total of 254 assemblies previously reported in storage at Shoreham were shipped to PECO Energy Company's Limerick plant. See Technical Note 14 in Appendix E.

Louisiana Power and Light Company

Waterford

POOL SITE #2701



Louisiana

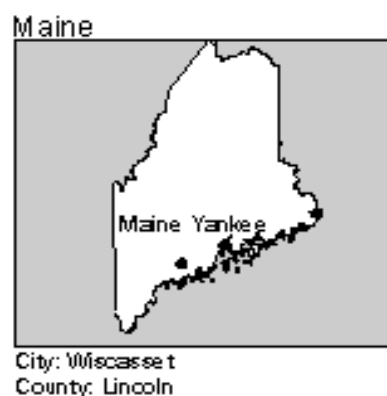
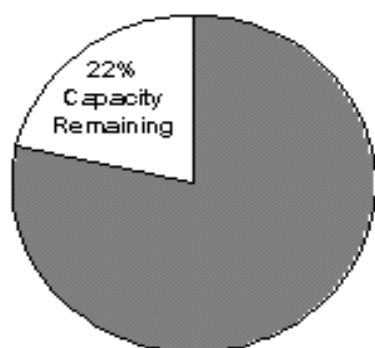
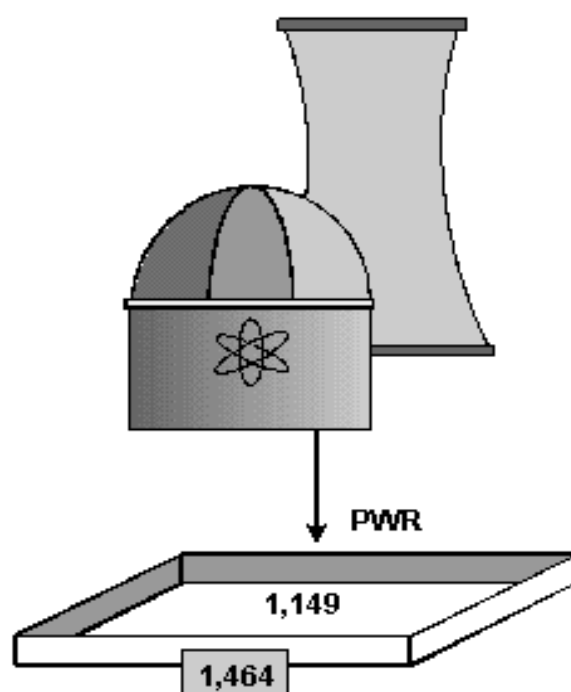


City: Taft
County: St. Charles

Maine Yankee Atomic Power Company

Maine Yankee

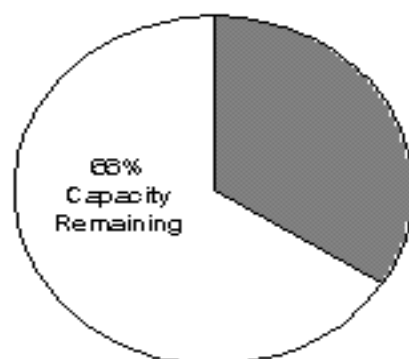
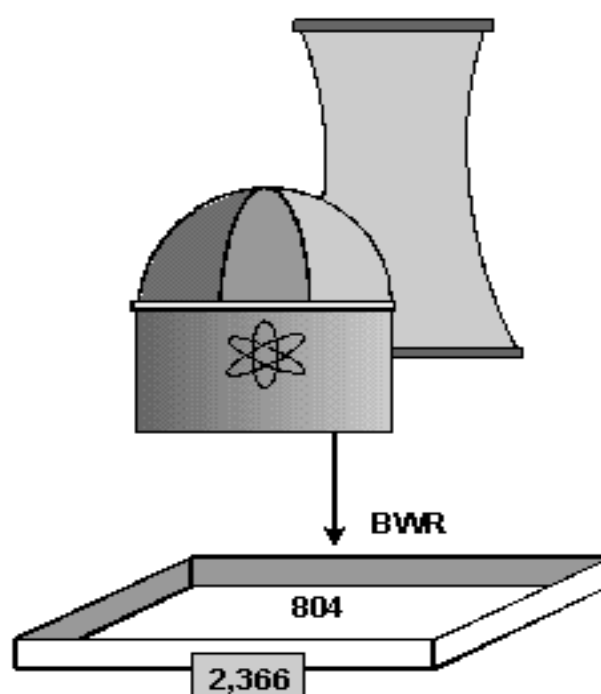
POOL SITE #2801



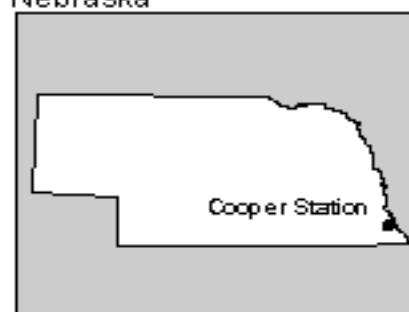
Nebraska Public Power District

Cooper Station

POOL SITE #3001



Nebraska

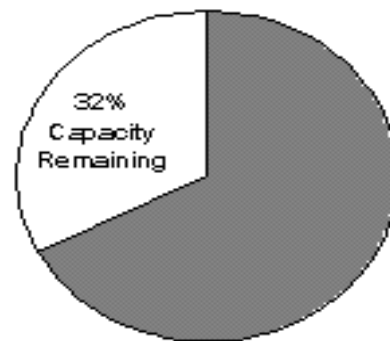
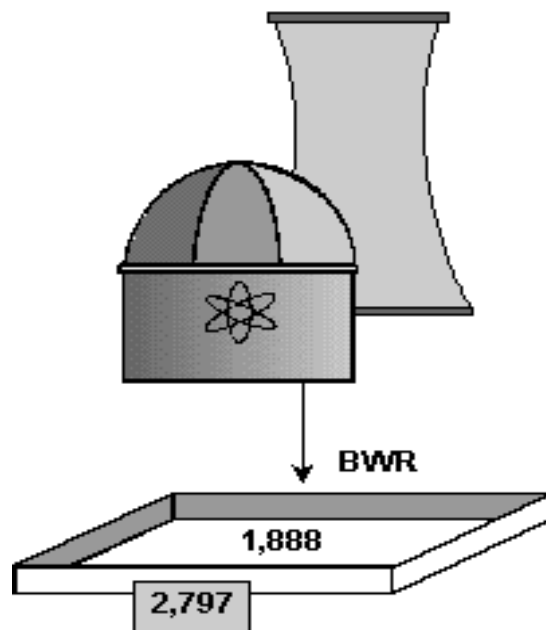


City: Brownville
County: Nemaha

New York Power Authority

FitzPatrick

POOL SITE #3901



New York



FitzPatrick

City: Scriba

County: Oswego

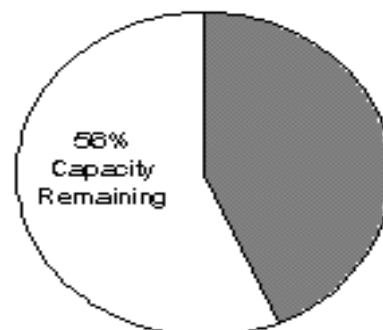
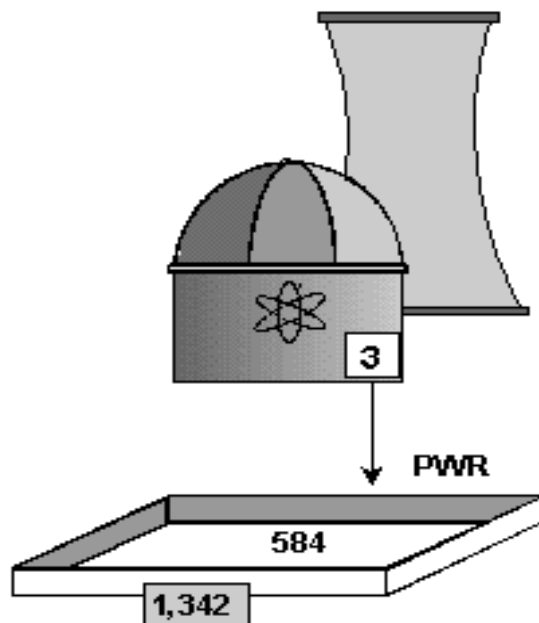
Indian Point

City: Buchanan

County: Westchester

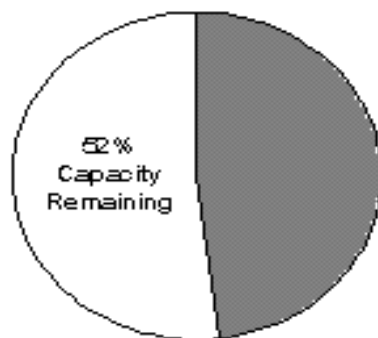
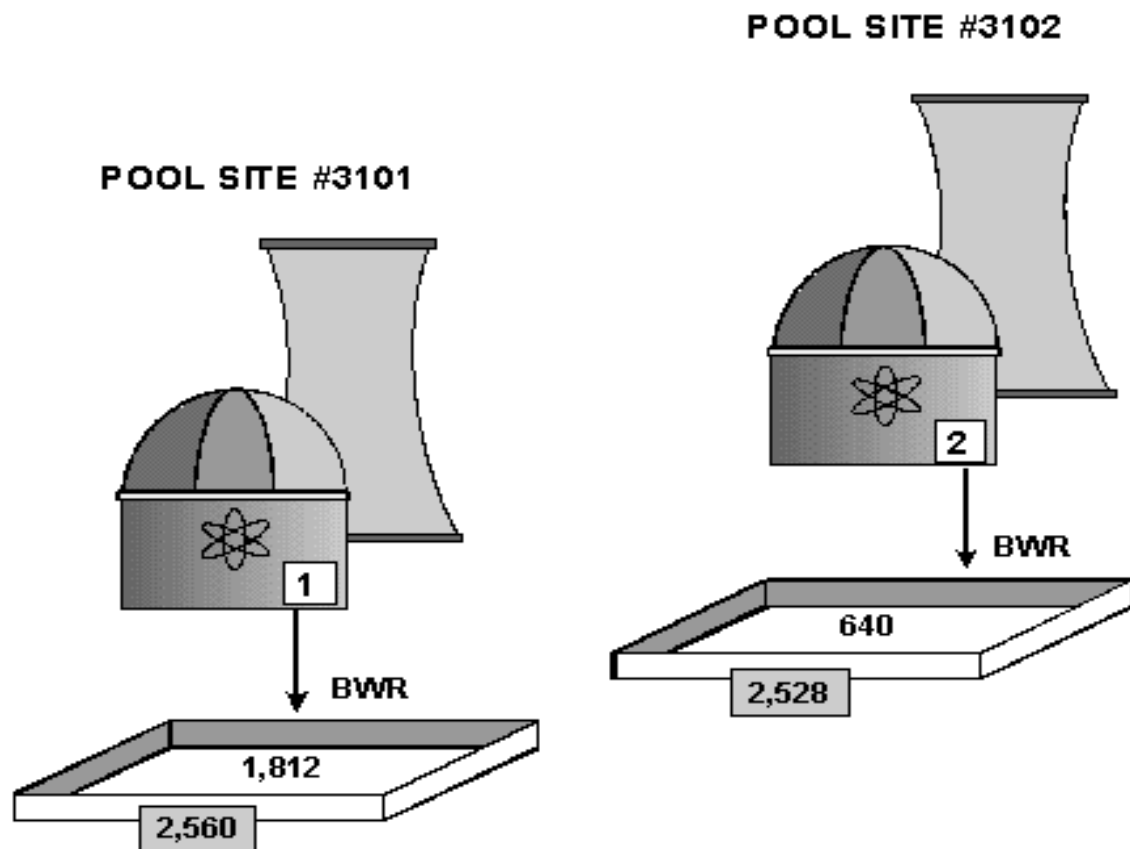
Indian Point

POOL SITE #3902



Niagara Mohawk Power Corporation

Nine Mile Point



New York

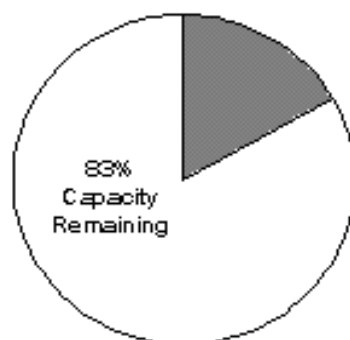
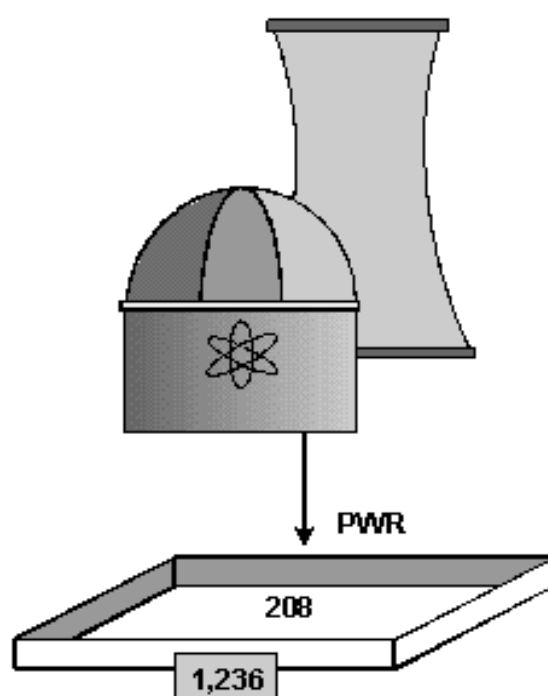


City: Oswego
County: Oswego

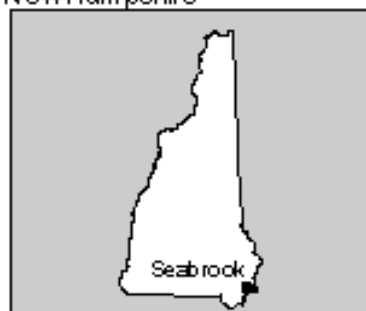
North Atlantic Energy Service Corporation

Seabrook

POOL SITE #5901

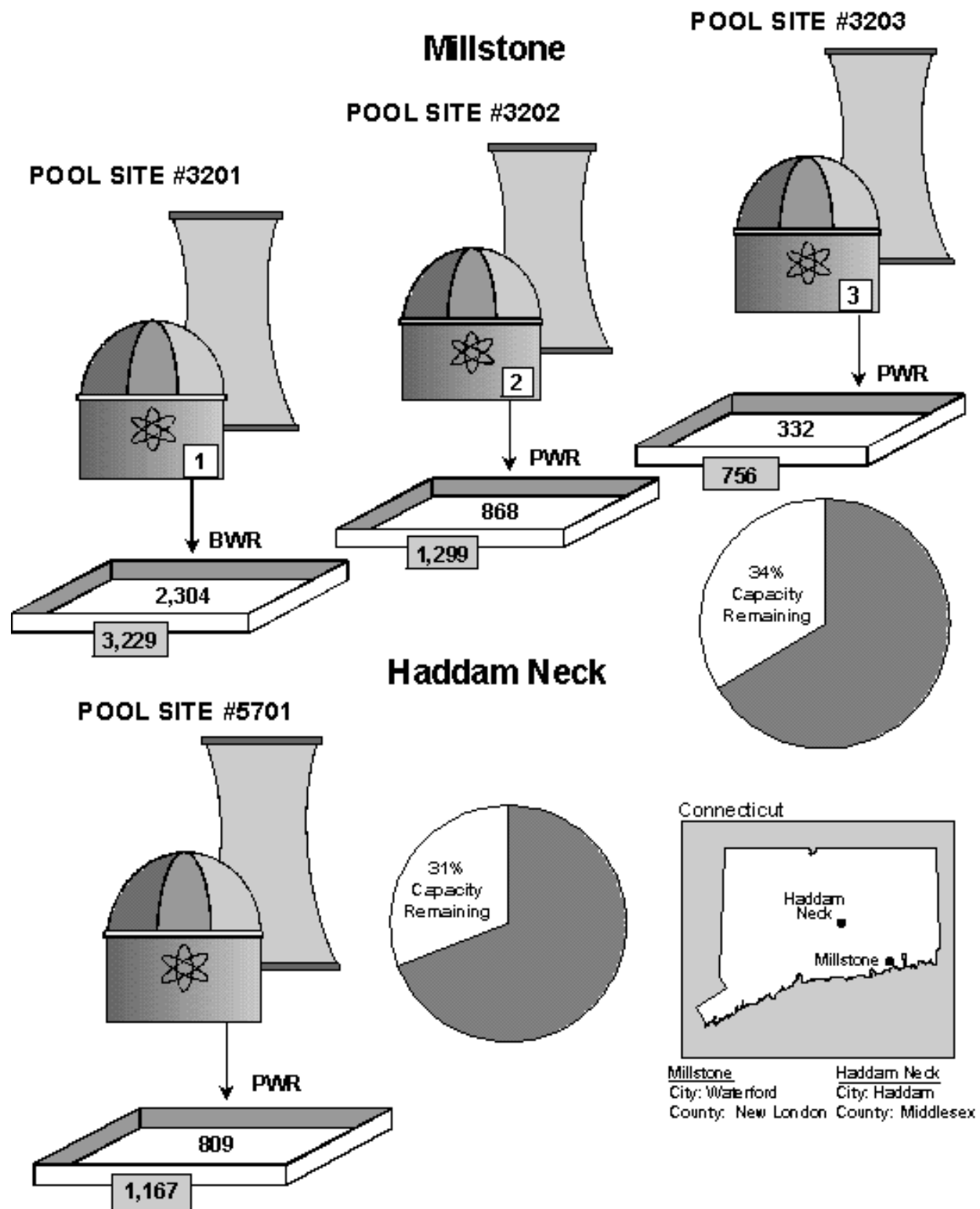


New Hampshire



City: Seabrook
County: Rockingham

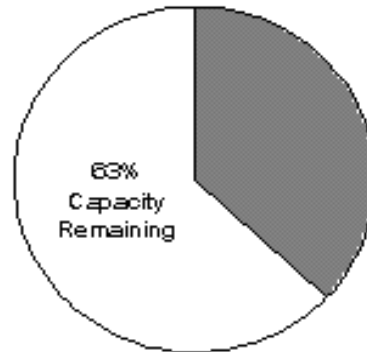
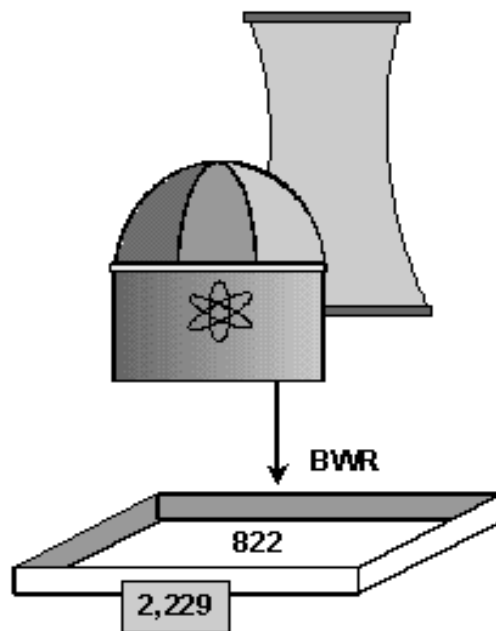
Northeast Utilities Service Company



Northern States Power Company

Monticello

POOL SITE #3301



Minnesota

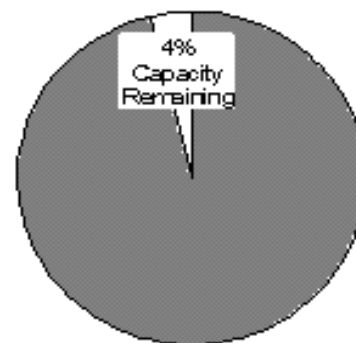
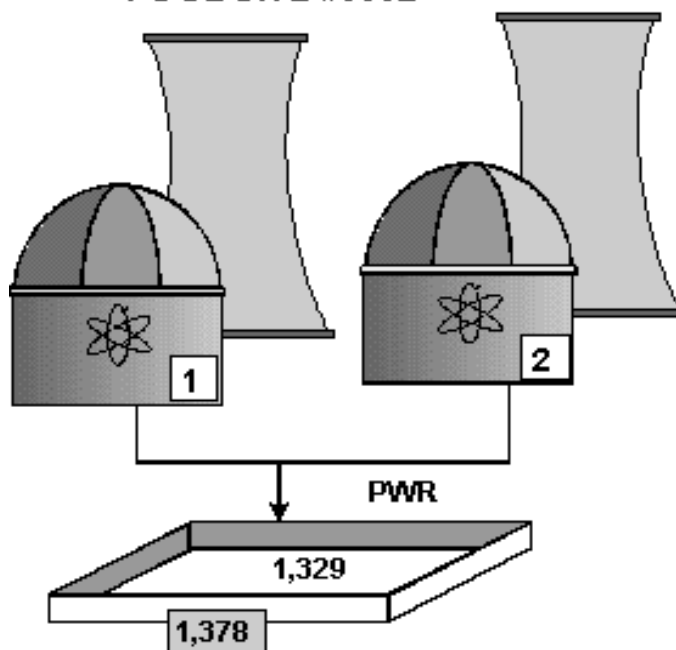


Monticello
City: Monticello
County: Wight

Prairie Island
City: Red Wing
County: Goodhue

Prairie Island

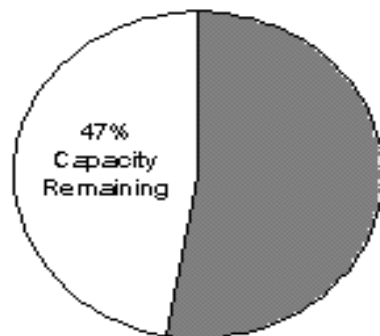
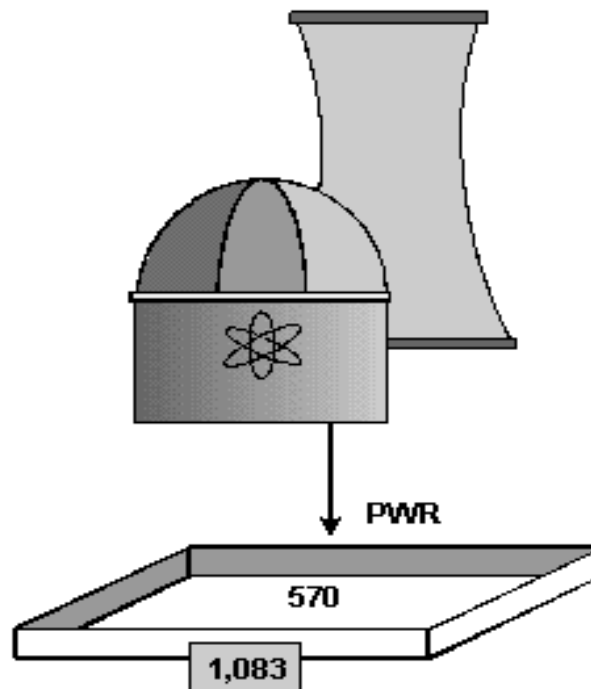
POOL SITE #3302



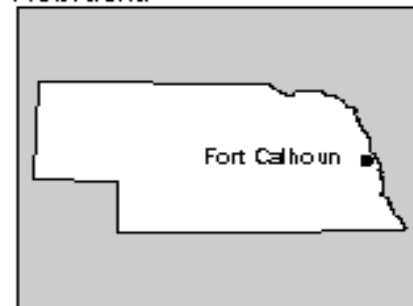
Omaha Public Power District

Fort Calhoun

POOL SITE #3401



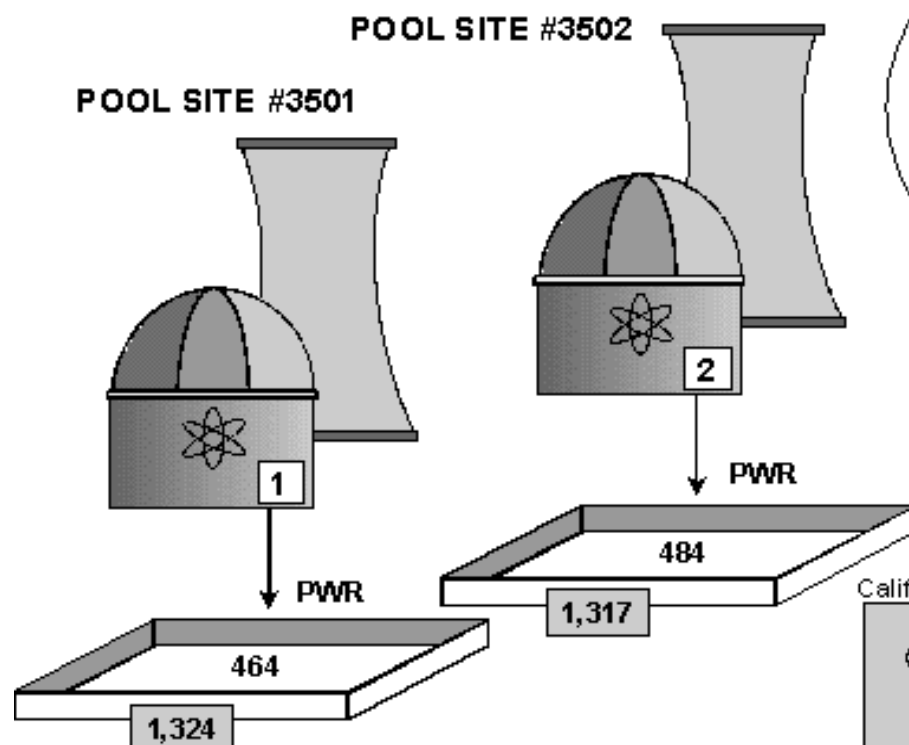
Nebraska



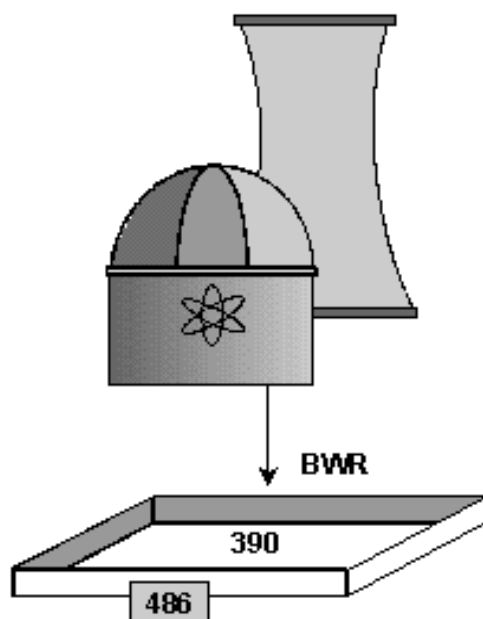
City: Fort Calhoun
County: Washington

Pacific Gas and Electric Company

Diablo Canyon

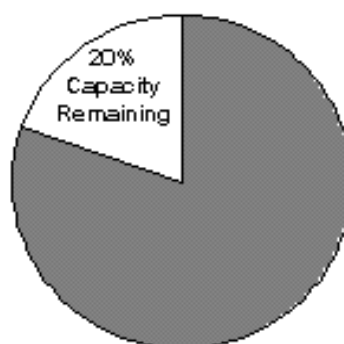


Humboldt Bay



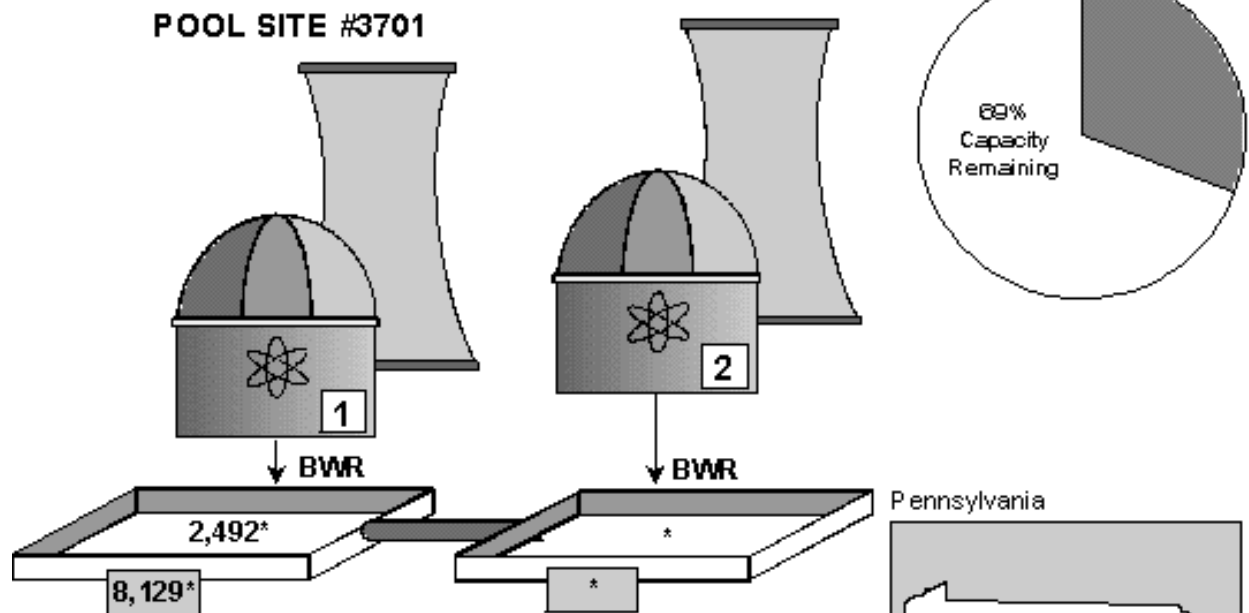
Diablo Canyon
City: Avila Beach
County: San Luis Obispo

Humboldt Bay
City: Eureka
County: Humboldt

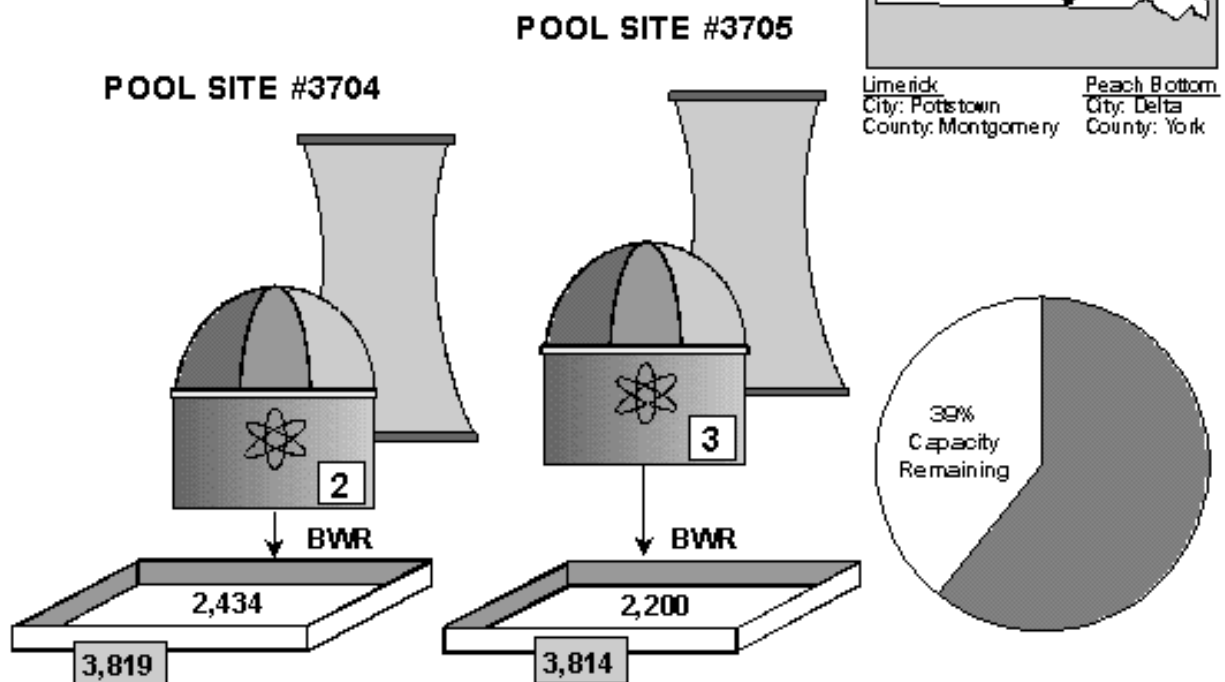


PECO Energy Company

Limerick



Peach Bottom

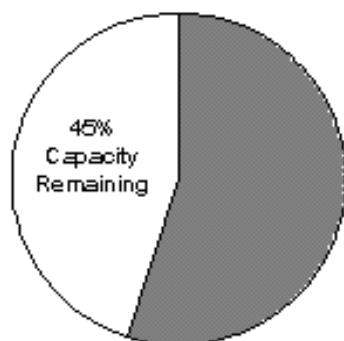
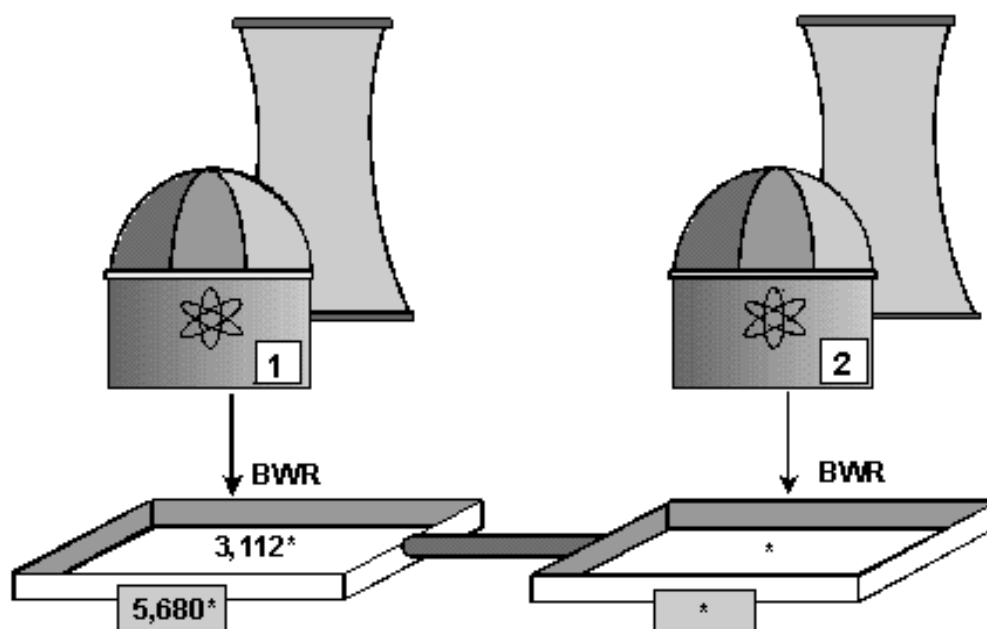


* Data are presented as single pool

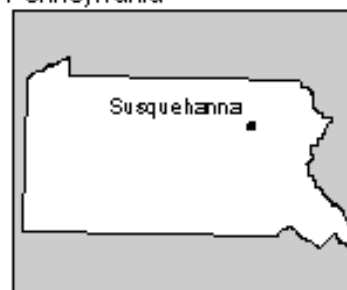
Pennsylvania Power and Light Company

Susquehanna

POOL SITE #3601



Pennsylvania



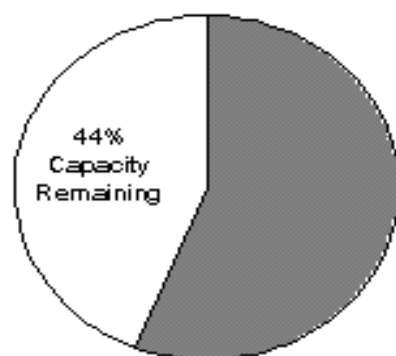
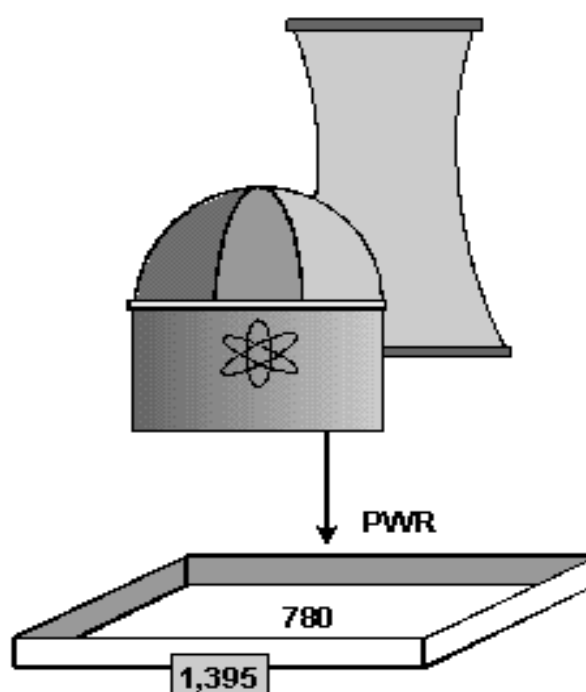
City: Berwick
County: Luzerne

* Data are presented as single pool

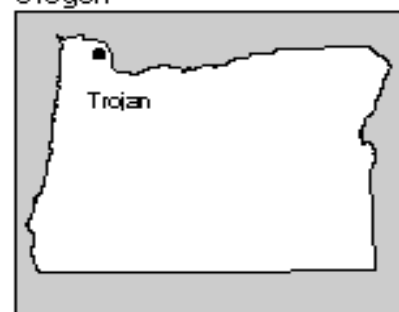
Portland General Electric Company

Trojan

POOL SITE #3801



Oregon

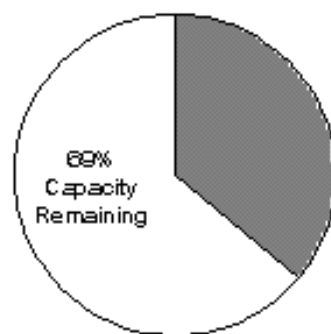
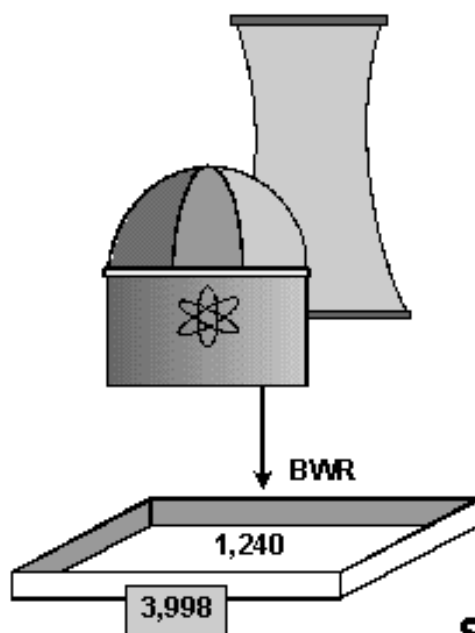


City: Prescott
County: Columbia

Public Service Electric and Gas Company

Hope Creek

POOL SITE #4201

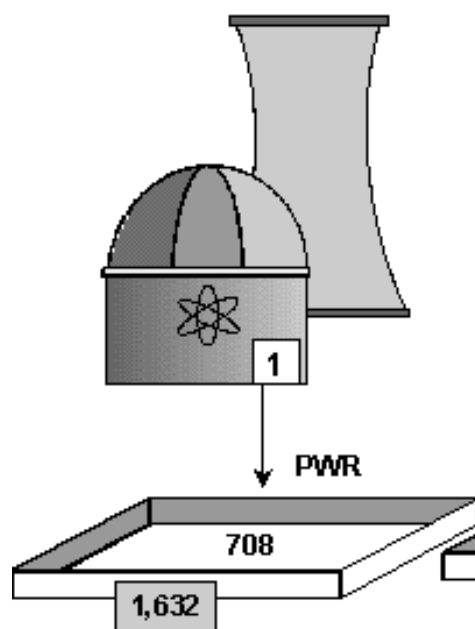


New Jersey

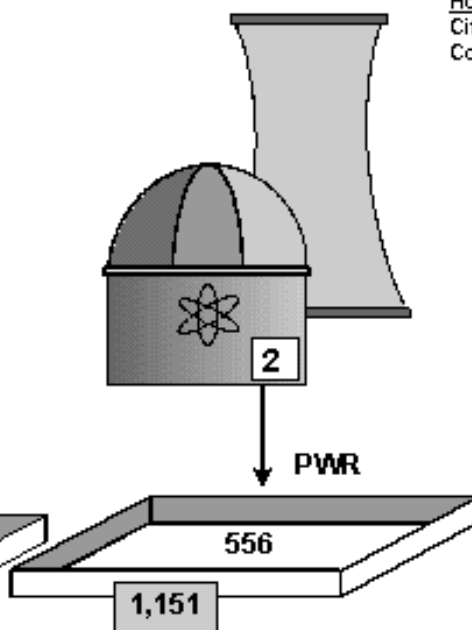


Salem

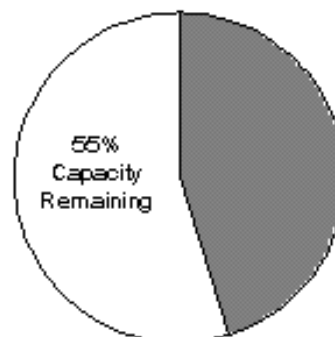
POOL SITE #4202



POOL SITE #4203



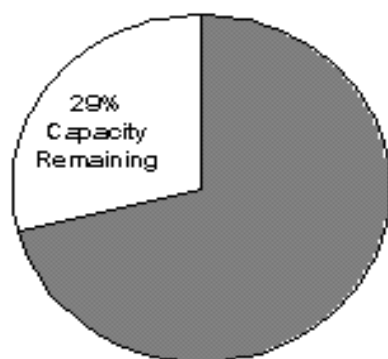
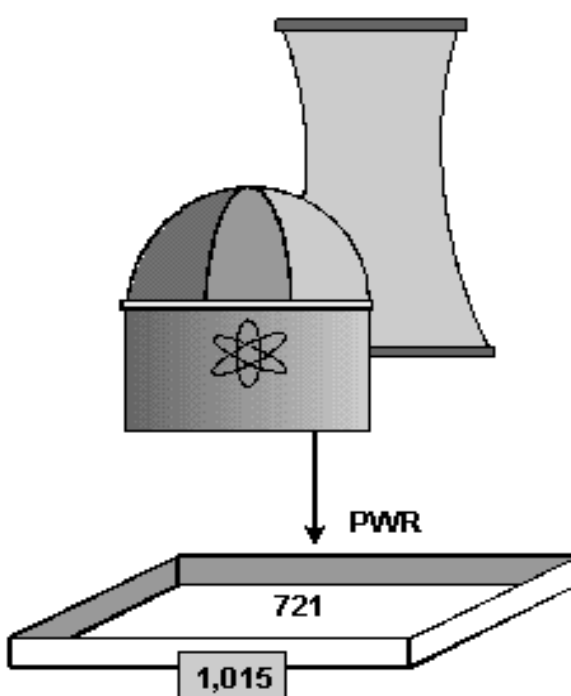
Hope Creek/Salem
City: Lower Alloways
County: Salem



Rochester Gas and Electric Company

Ginna

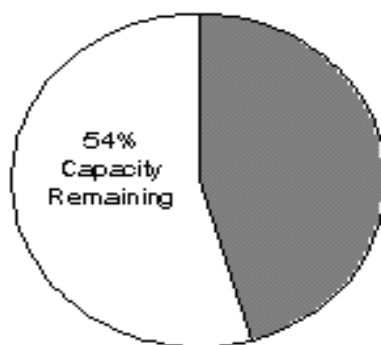
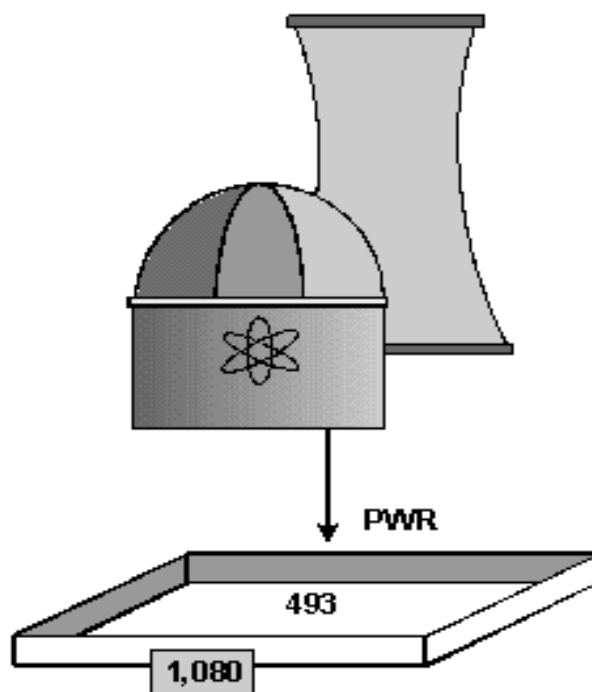
POOL SITE #4401



Sacramento Municipal Utility District

Rancho Seco

POOL SITE #4501



California

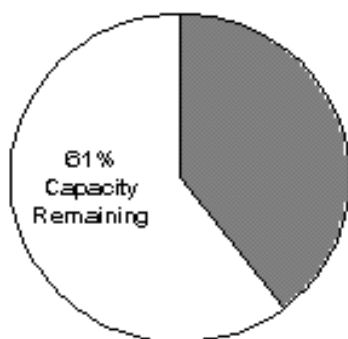
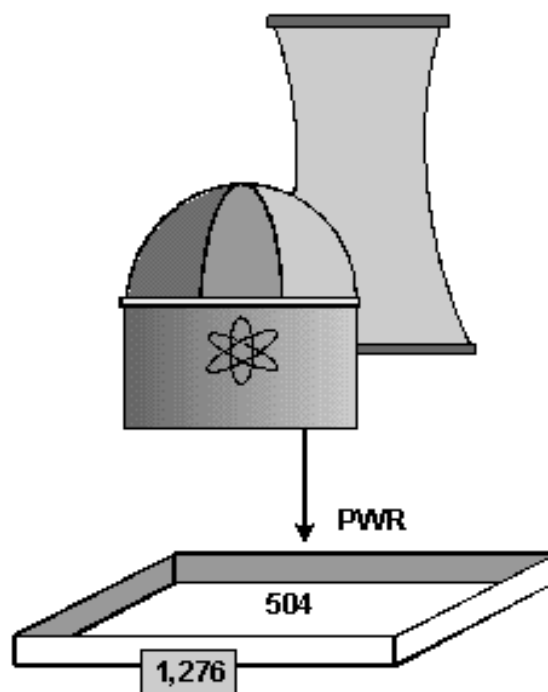


City: Ione
County: Sacramento

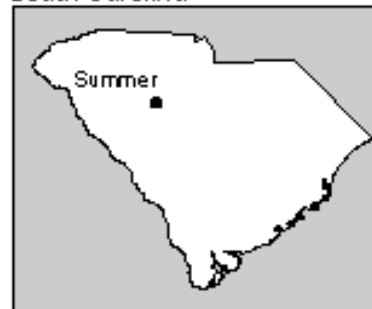
South Carolina Electric and Gas Company

Summer

POOL SITE #4601



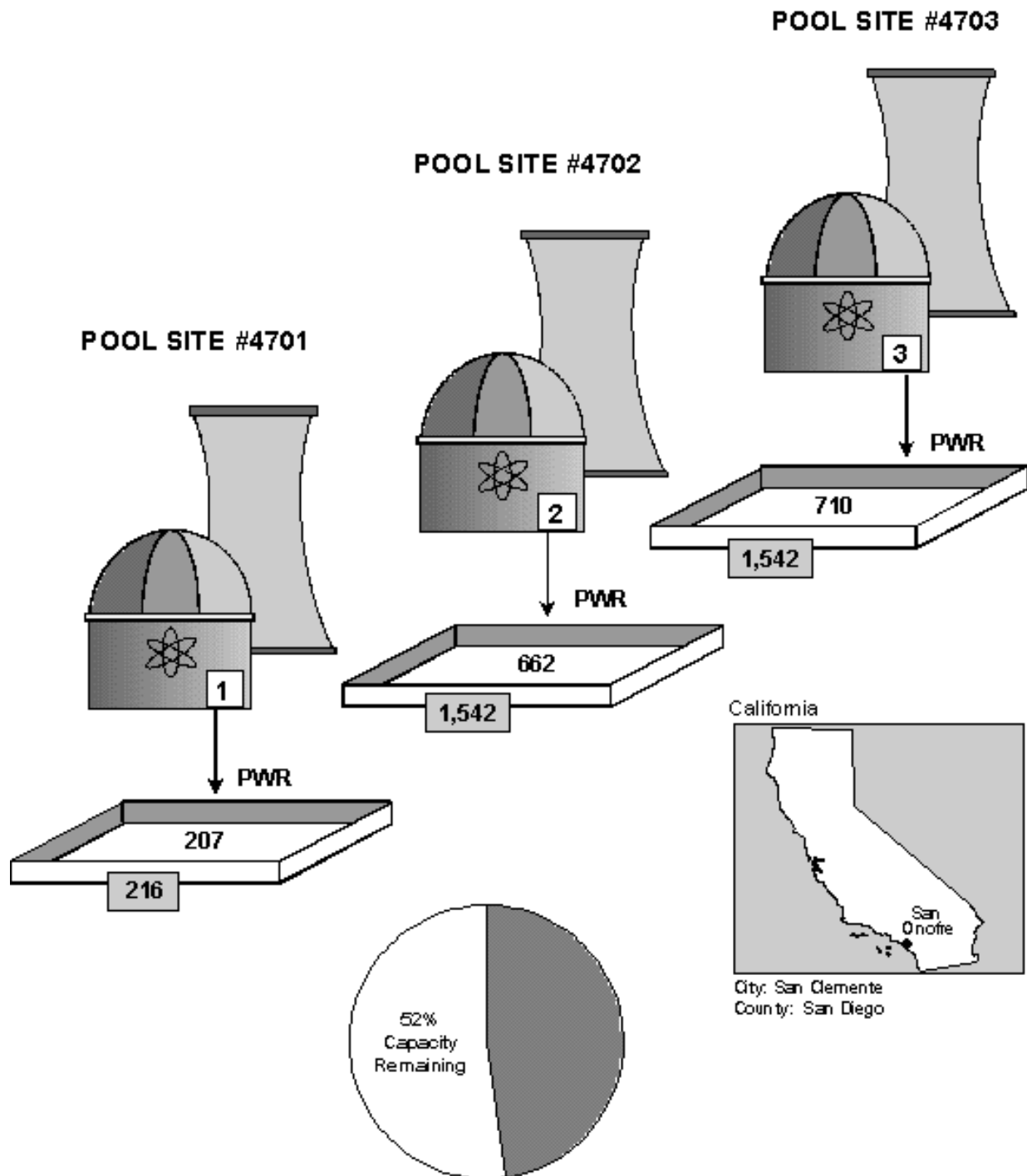
South Carolina



City: Parr
County: Fairfield

Southern California Edison Company

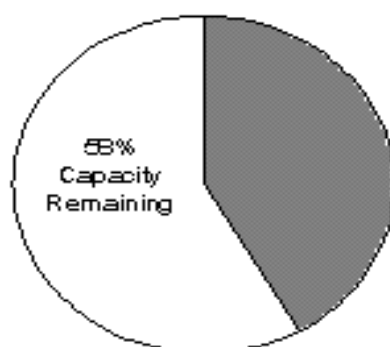
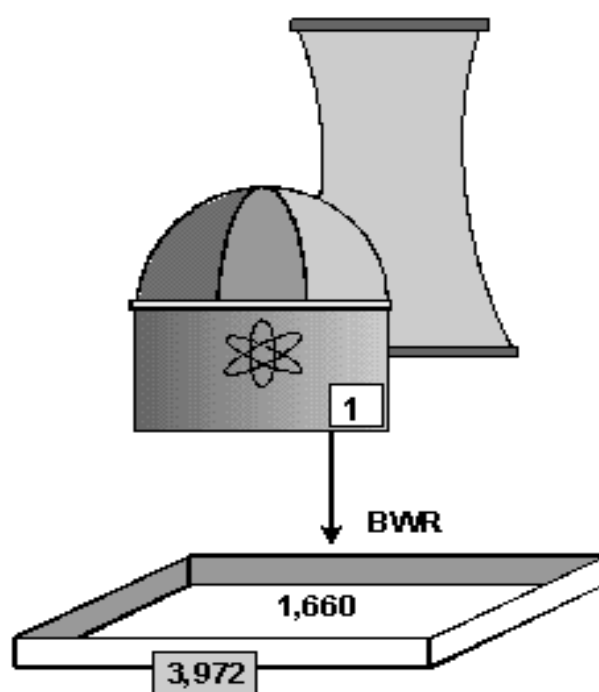
San Onofre



System Energy Resources, Inc.

Grand Gulf

POOL SITE #2901



Mississippi

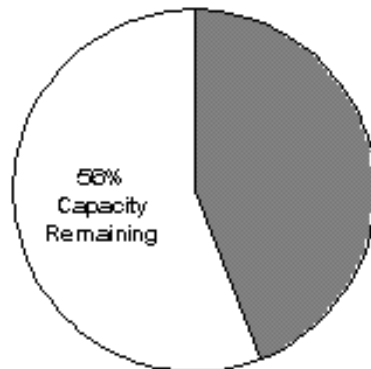
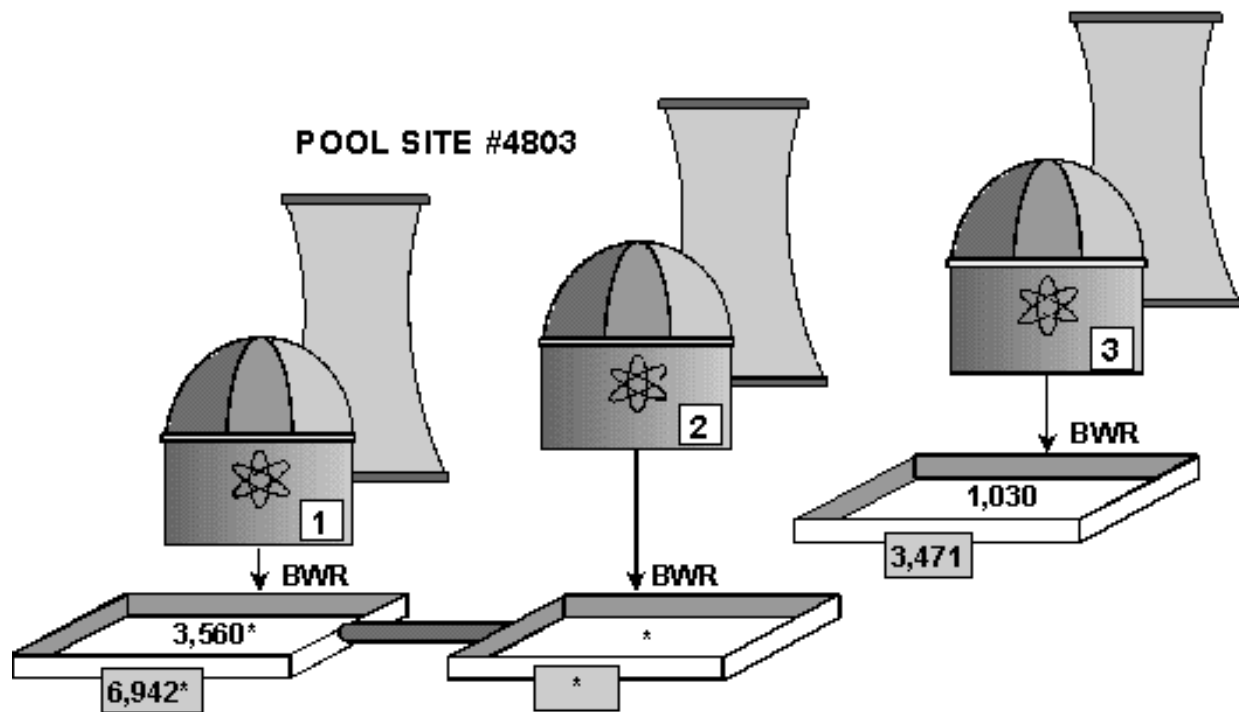


City: Port Gibson
County: Claiborne

Tennessee Valley Authority

Browns Ferry

POOL SITE #4805



Alabama



City: Decatur
County: Limestone

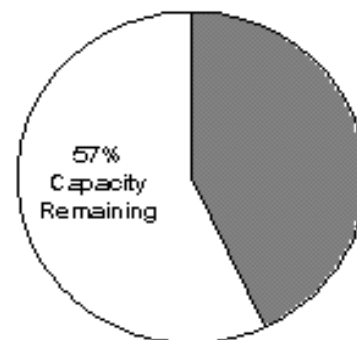
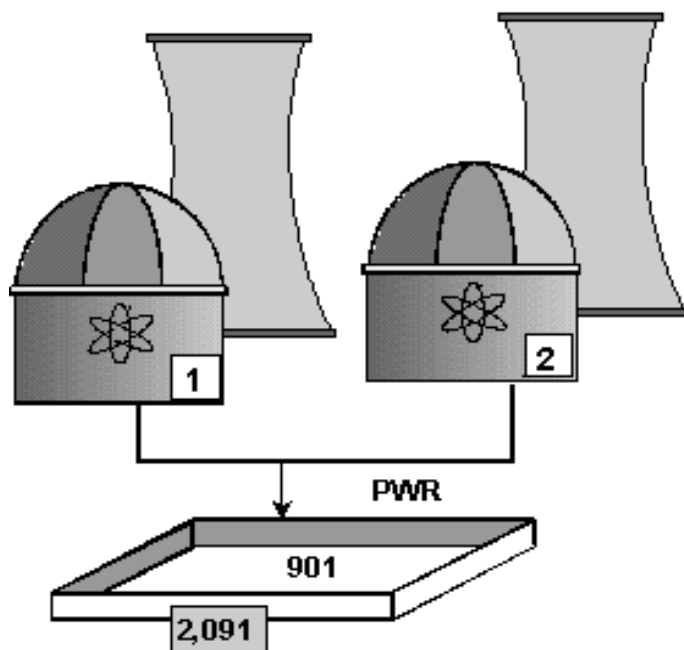
* Data are presented as single pool.

Tennessee Valley Authority

(Continued)

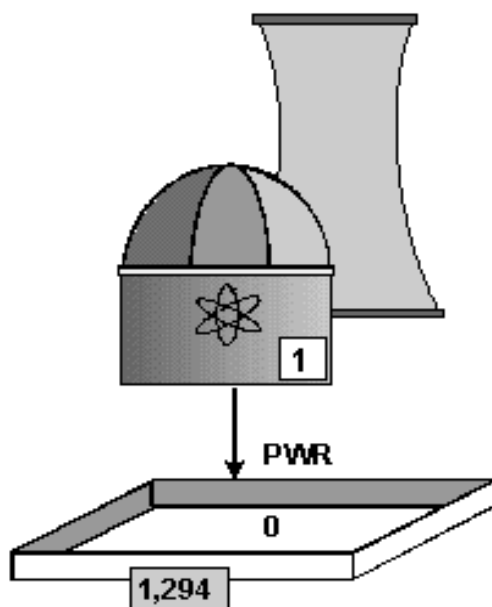
Sequoyah

POOL SITE #4808

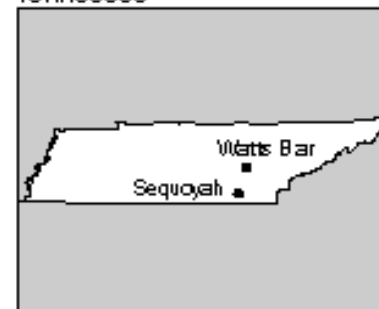


Watts Bar

POOL SITE #4810



Tennessee



Sequoyah

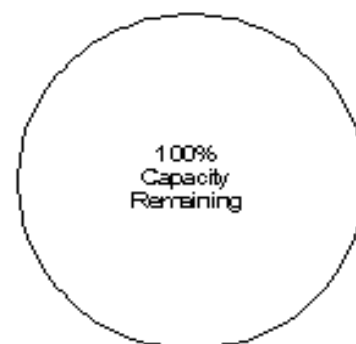
City: Soddy Daisy

County: Hamilton

Watts Bar

City: Spring City

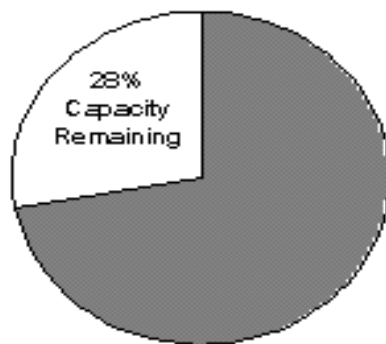
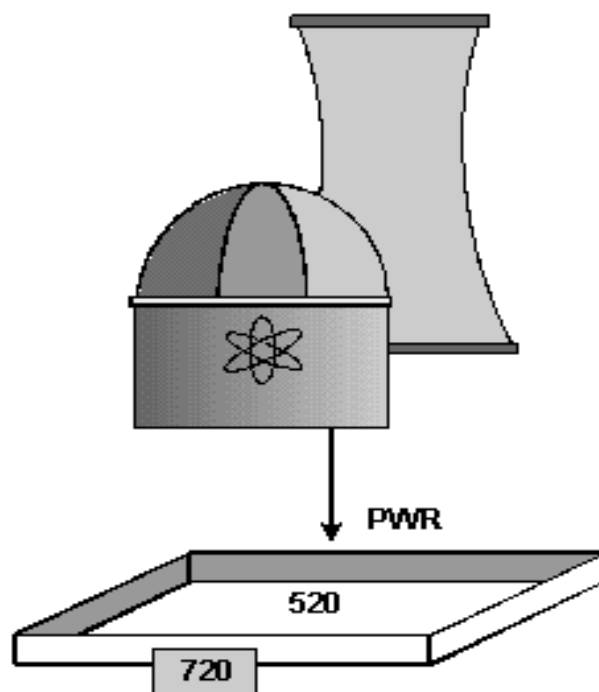
County: Rhea



Toledo Edison Company

Davis-Besse

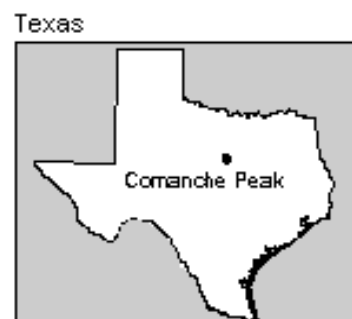
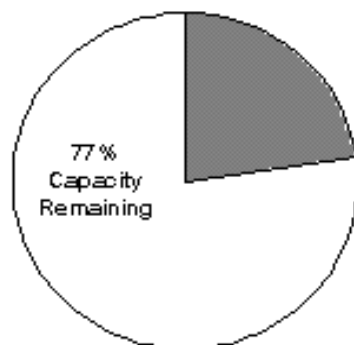
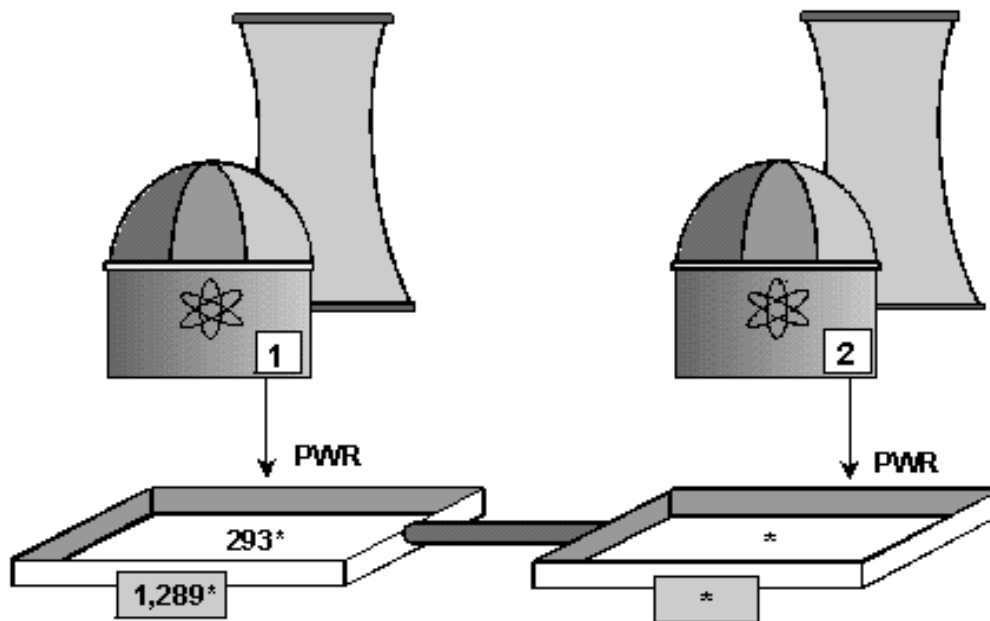
POOL SITE #5001



TU Electric

Comanche Peak

POOL SITE #4901



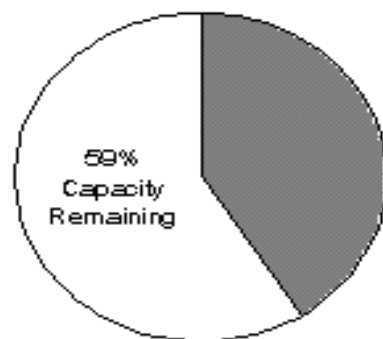
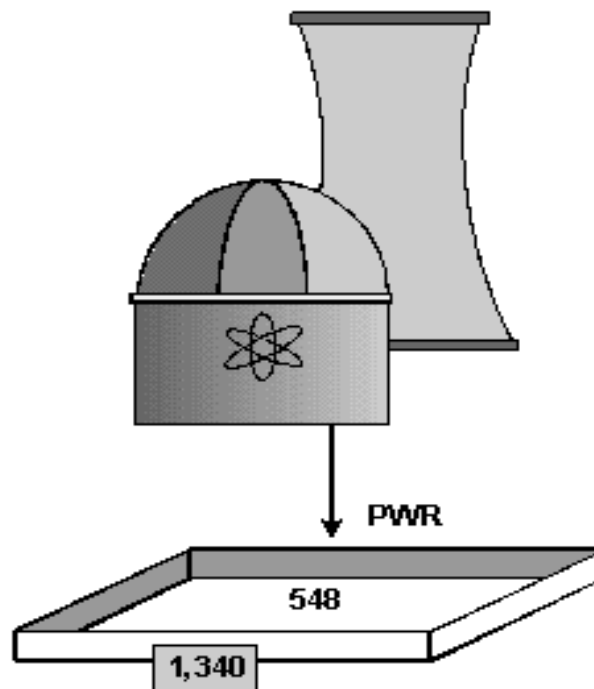
City: Glen Rose
County: Somervell

* Data are presented as single pool.

Union Electric Company

Callaway

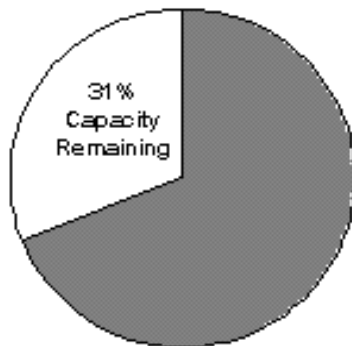
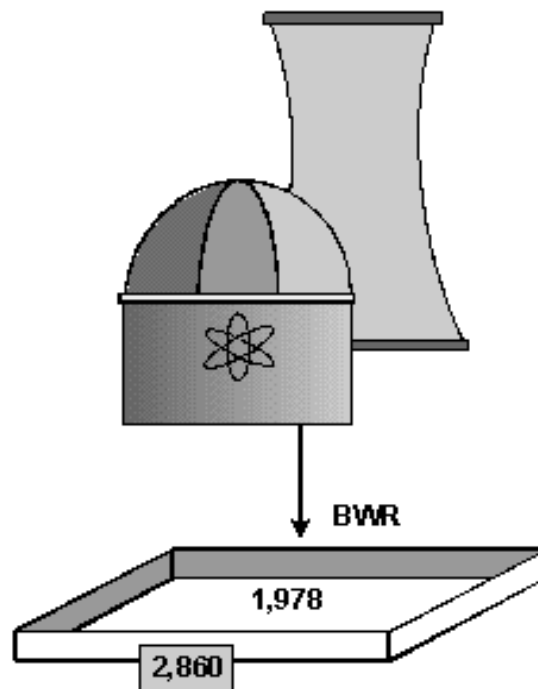
POOL SITE #5101



Vermont Yankee Nuclear Power Corporation

Vermont Yankee

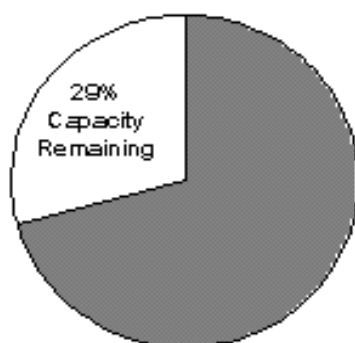
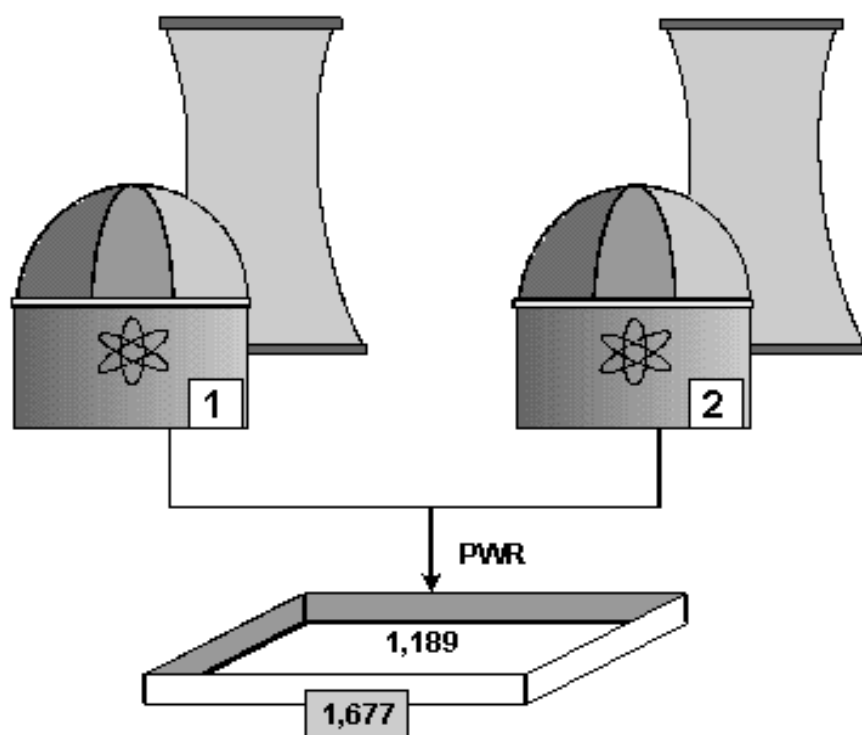
POOL SITE #6001



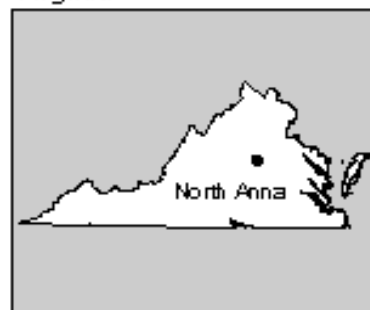
Virginia Power

North Anna

POOL SITE #5201



Virginia

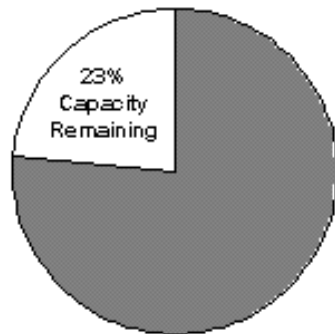
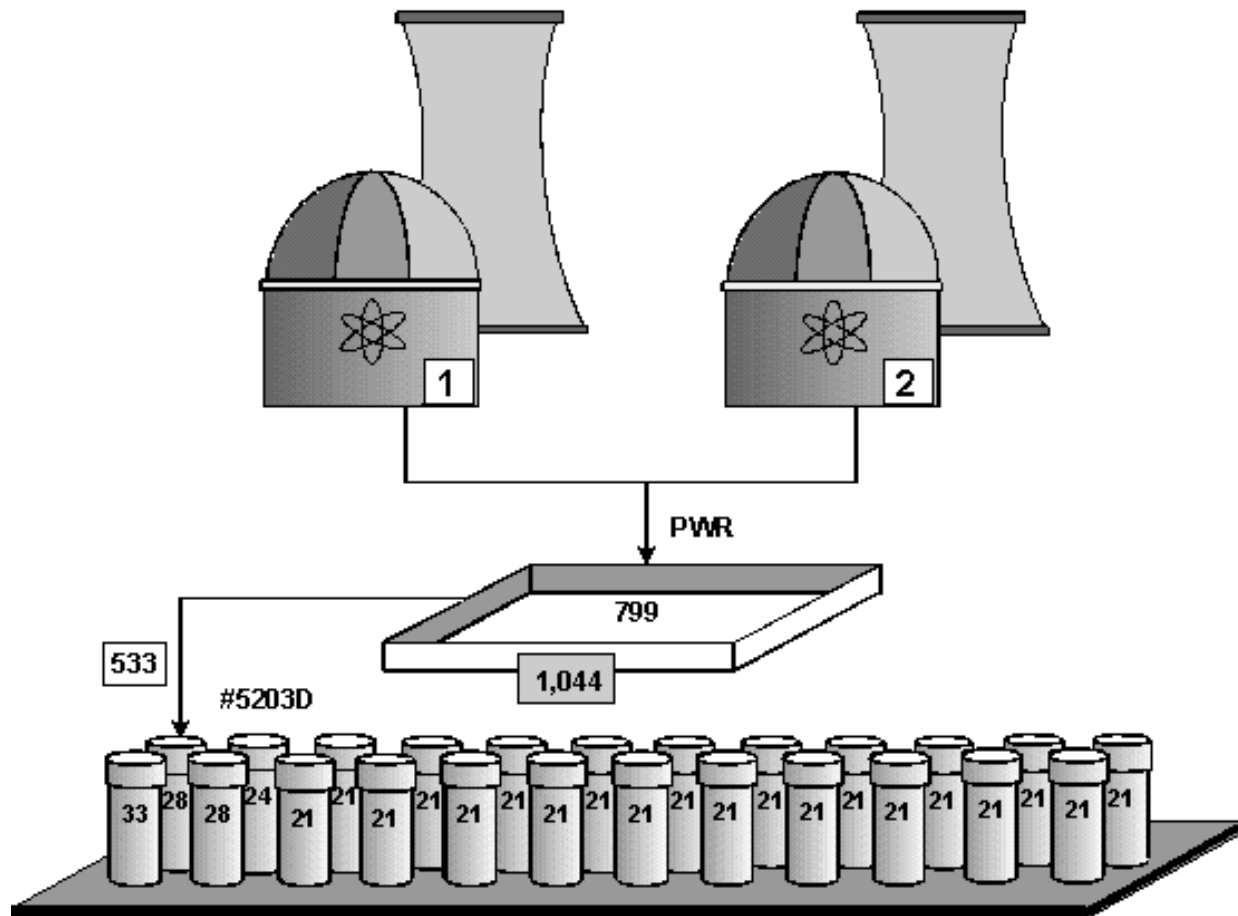


City: Mineral
County: Louisa

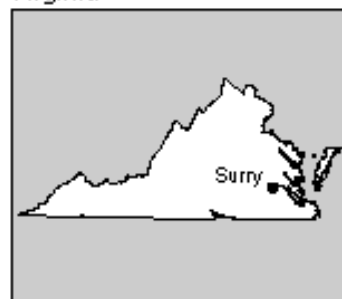
Virginia Power (Continued)

Surry

POOL SITE #5203



Virginia

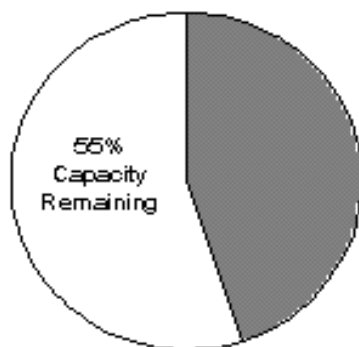
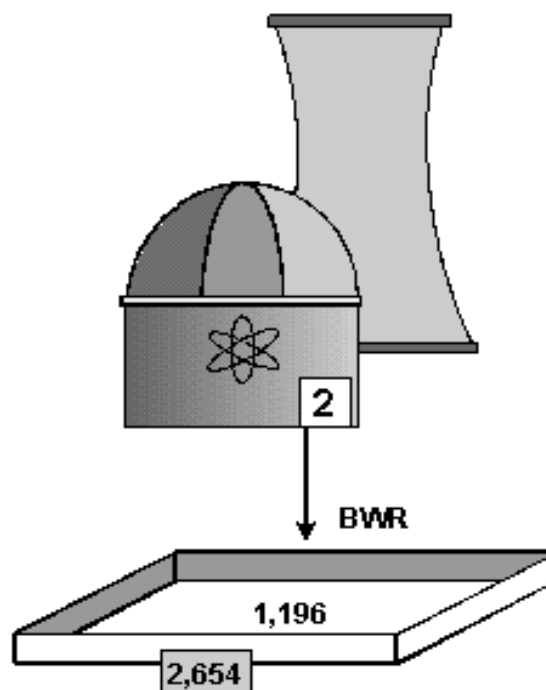


City: Gravel Neck
County: Surry

Washington Public Power Supply System

Washington Nuclear

POOL SITE #5302



Washington

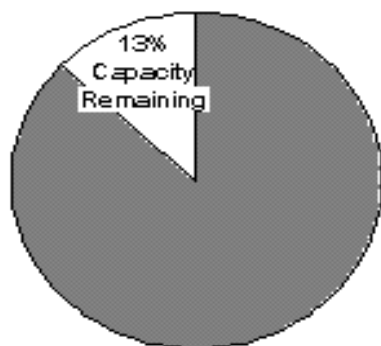
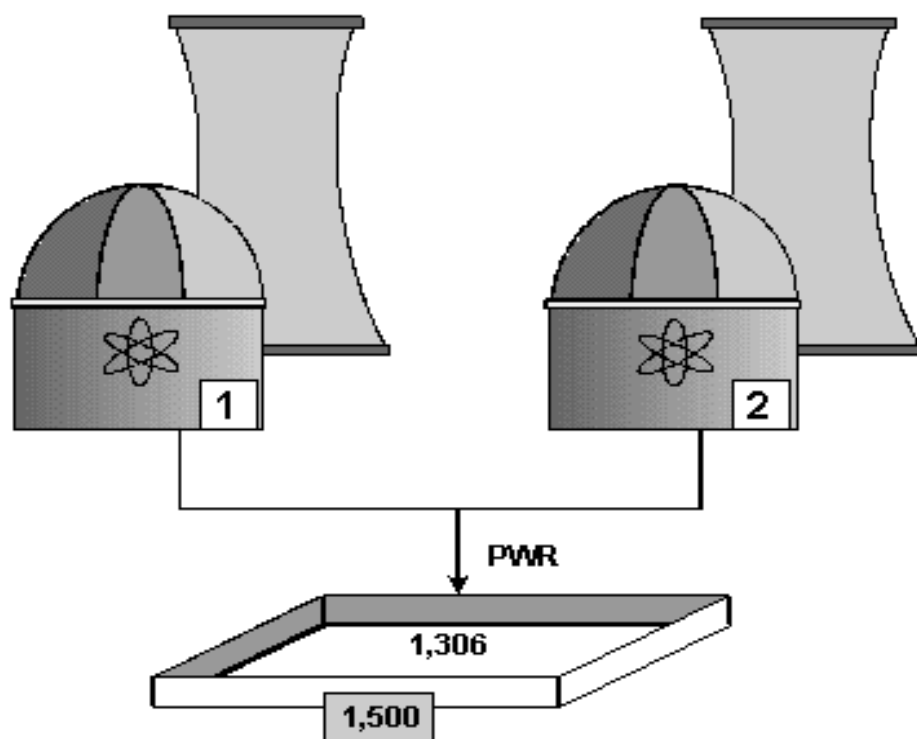


City: Richland
County: Benton

Wisconsin Electric Power Company

Point Beach

POOL SITE #5401



Wisconsin

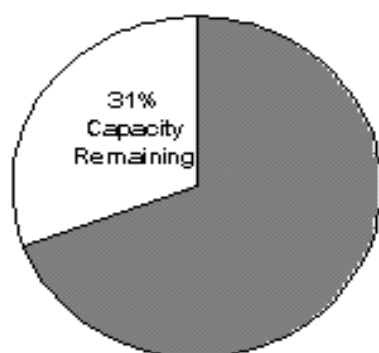
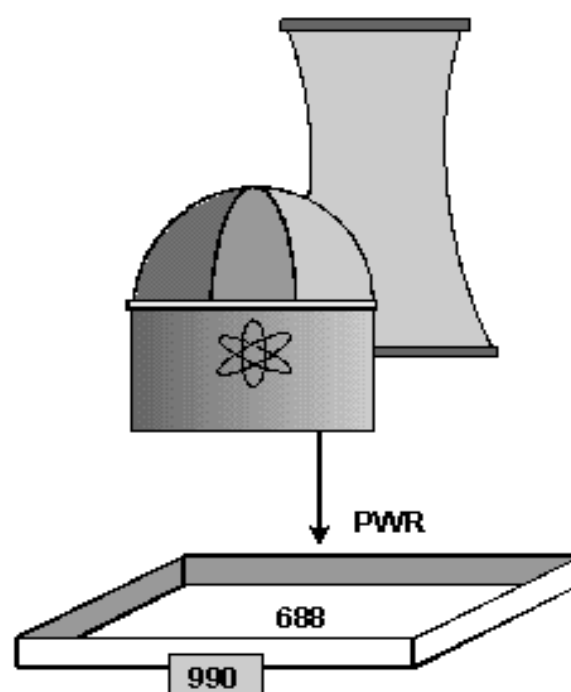


City: Two Creeks
County: Manitowish

Wisconsin Public Service Corporation

Kewaunee

POOL SITE #5501



Wisconsin

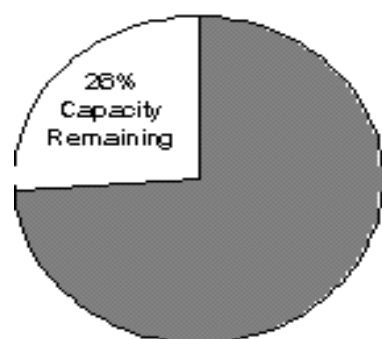
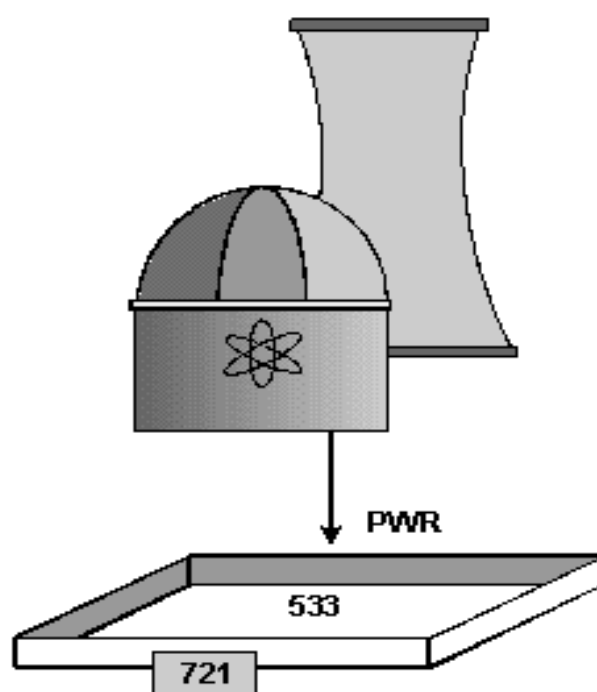


City: Carlton
County: Kewaunee

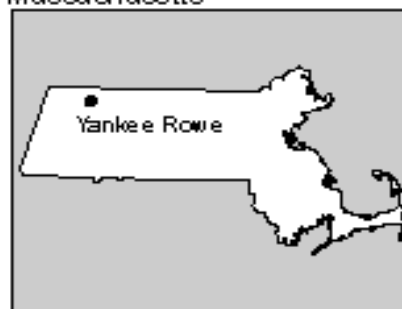
Yankee Atomic Electric Company

Yankee Rowe

POOL SITE #5601



Massachusetts



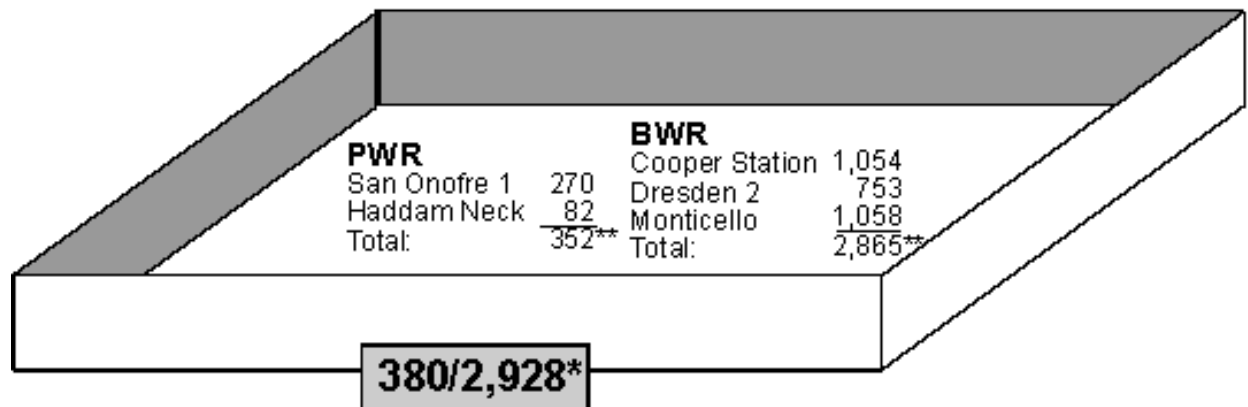
City: Town of Rowe
County: Franklin

General Electric Company

Morris Operation

Away-from-reactor Spent Fuel Storage Facility

POOL SITE #6601



Illinois



City: Morris
County: Grundy

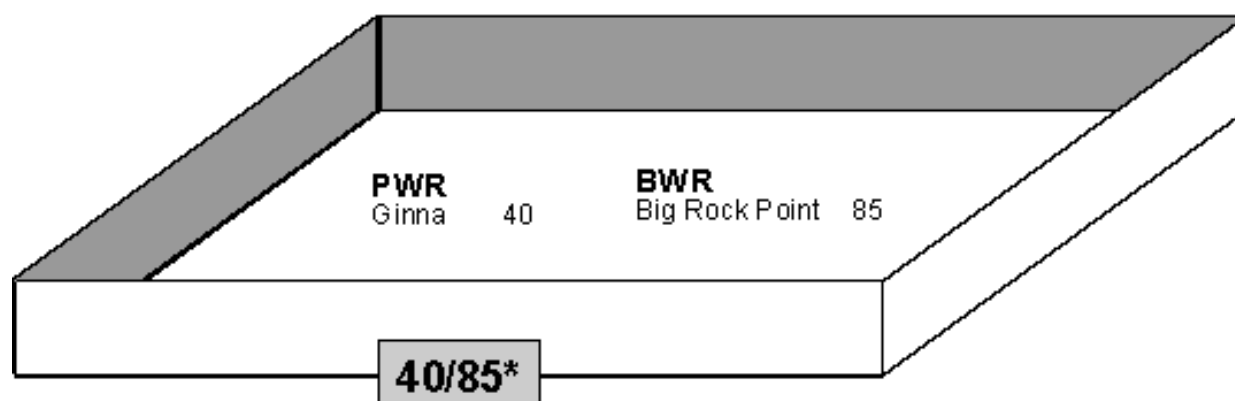
* The first number in the ratio denotes the maximum established storage capacity for assemblies in the PWR portion of the General Electric Company's Morris Operation spent fuel storage facility. The second number is the maximum established storage capacity for assemblies in the BWR portion of the General Electric Company's Morris Operation spent fuel storage facility.

** There are 7 slots still available for use. If PWR assemblies are stored, 4 assemblies will fit into each of the 7 slots totalling 28 assemblies. If BWR assemblies are stored, 9 assemblies will fit into each of the 7 slots totalling 63 assemblies.

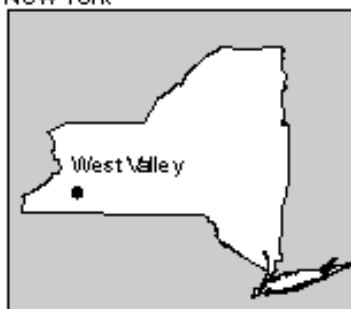
West Valley Demonstration Project

Away-from-reactor Spent Fuel Storage Facility

POOL SITE #7005



New York



City: West Valley
County: Cattaraugus

* The first number in the ratio denotes the maximum established storage capacity for assemblies in the PWR portion of West Valley's spent fuel storage facility. The second number is the maximum established storage capacity for assemblies in the BWR portion of West Valley's spent fuel storage facility.

Quality Assurance

Data submitted by respondents to the Form RW-859 Nuclear Fuel Data survey are subject to extensive Energy Information Administration (EIA) quality assurance (QA) procedures to ensure their accuracy and completeness. A mainframe EIA QA program, written in Pascal, generates a nuclear fuel cycle matrix and summary reports for each reactor. These reports identify and highlight errors in assembly and fuel batch data submitted by nuclear fuel utilities on Form RW-859. Analysts review the EIA QA matrix report produced by the program to check that the data submitted are consistent with data obtained from previous surveys.

A sample EIA QA report for one reactor on the Form RW-859 data base is presented in Figure D1. The QA report is divided into three parts. The first part of the report is composed of a nuclear fuel cycle matrix generated from assembly data aggregated to the batch level, which presents the fuel batches through their cycle history. The format helps to identify and highlight corrections needed for data on assemblies and batches of irradiated and unirradiated fuel. The sum of the number of assemblies in the fuel batches in the reactor core during each fuel cycle are compared with the reactor's full core capacity. In addition, assemblies permanently or temporarily discharged (as indicated by their status codes) are aggregated and compared with totals of assemblies discharged and currently not in cycle. The matrix extends over all

reactor cycles from reactor startup to the fifth cycle past the current reporting period. Other key data displayed in the matrix include utility ID, cycle discharge dates, batch status, initial uranium content, burnup, assay (enrichment percent), assembly type codes, and an indicator for defective fuel.

The second part of the report contains a discharge/storage summary page, which is composed of three groups of data. Group 1 represents a count of the assemblies discharged at the end of each cycle. Group 2 represents the net cumulative total number of assemblies in storage during each cycle. Group 3 represents net cumulative totals of initial uranium content for assemblies stored during each cycle. The cycle number and end date for the reactor's next (n+1) cycle also appears on the page.

The final part of the report, the storage pool inventory report, lists storage pool inventories (and reactors contributing to the pool) as of the end of the survey report period. Inventories are subdivided into permanent and temporary discharges. Storage pool inventories by pool ID, based on assembly status codes, are compared with those based on the reactor's reported total inventory. The number of canisters in storage and the number of assemblies contained in these canisters are also reported. Assembly type and pool type (wet or dry) are also indicated.

Figure D1. Energy Information Administration Quality Assurance Report

Nuclear Fuel Matrix

Utility ID = 21 Utility Name: Gulf States Utilities Company
Reactor ID = 01 Reactor Name: River Bend 1

Entries in cycle matrix are number of assemblies.

		Cycle →				01	02	03	04	05	06	07	08	09	10
		Discharge Date →				8709	8903	9009	9203	9404	9509	9703	9809	0003	0109
Batch	Stat	Assmb Type Codes	Assmbs	Initial Uranium Content (MTU)	Burnup (MWD/MTU)	Assay (%)	DEF								
01	D	G4608GB	76	14.149	3000	0.711		76							
02	D	G4608GB	88	16.343	8000	0.936		88							
03	D	G4608GB	20	3.718	10000	0.936		20							
04	D	G4608GB	120	22.230	17000	1.633		120	120						
05	D	G4608GB	82	15.165	22000	2.477		82	82						
06	D	G4608GB	148	27.365	26998	2.477		148	148	148					
07	D	G4808GB	28	5.174	28000	2.775		28	28	28					
10	D	G4608GB	48	8.875	30000	2.481		48	48	48					
11	D	G4608GB	12	2.217	30000	2.770		12	12	12					
10	D	G4608GB	2	0.370	30000	2.481		2	2	2					
10F	D	G4608GB	1	0.185	22000	3.062	#	1	1	1					
11F	D	G4608GB	1	0.185	23000	3.001	#	1	1	1					
12	D	G4608GB	86	15.940	31000	3.007		86	86	86					
13	D	G4608GB	51	9.450	31000	3.061		51	51	51					
1	D	G4608GB	24	4.371	32000	2.990		24	24	24	24				
12	I	G4608GB	1	0.185	0	3.007		1	1	1	1				
2	D	G4608G8	62	11.055	32000	3.220		62	62	62	62				
3	D	G4608G8	24	4.279	37000	3.220		24	24	24	24				
4	D	G4608G8	28	4.992	35000	3.220		28	28	28	28				
5	D	G4608G8	50	8.914	31000	3.220		50	50	50	50				
5	D	G4608G8	1	0.178	31000	3.220	#	1	1	1	1				
*C	I		59	0.0	0	0.0		59	59	59	59				
*D	I		176	0.0	0	0.0		176	176	176	176				
6	D	G4608G8	3	0.533	12000	3.340		3	3	3	3				
6	D	G4608G8	1	0.178	12000	3.340	#	1	1	1	1				
22	I	G4608G8	183	32.472	0	3.338		183	183	183	183				
23	I	G4608G8	13	2.307	0	3.338		13	13	13	13				
1	I	G4608G8	136	24.154	0	3.335		136	136	136	136				
2	I	G4608G8	56	9.932	0	3.337		56	56	56	56				
1			40	7.101	36000	3.327						40			
2			152	27.024	37000	3.336						152			
1			8	1.420	37000	3.327							8		
2			48	8.534	37000	3.336							48		
3			96	17.050	37000	3.335							96		
4			40	7.094	37000	3.337							40		
1			104	18.227	41000	3.525								104	
2			32	5.606	41000	3.524								32	
3			36	6.394	39000	3.335								36	
4			16	2.838	38000	3.337								16	
1			8	1.402	40000	3.525									8
2			40	7.007	41000	3.524									40
3			84	14.722	40000	3.525									84
4			56	9.805	43000	3.813									56
Number of Assemblies in Core						624	624	624	624	624	624	192	192	188	188
Difference from Core Size						0	0	0	0	0	0	-432	-432	-432	-436

Status Codes "D," "T": record type 13 historical data.
Status Code "I": record type 15 in core data.
Status Code " ": record type 14 projected data.

Figure D1. Energy Information Administration Quality Assurance Report (Continued)

Discharge/Storage Summary

Utility ID = 21 Utility Name: Entergy Operations, Inc.
 Reactor ID = 01 Reactor Name: River Bend 1

	Cycle → Discharge Date →	01 8709	02 8903	03 9009	04 9203	05 9404	06 9509	07 9703	08 9809	09 0003	10 0109
Assemblies Discharged from Cycle (Gross) ^a		164	224	178	200	193	624	192	192	188	188
Permanently Discharged		164	222	178	199	193	624	192	192	188	188
Temporarily Discharged (per logic)		0	2	0	1	0	0	0	0	0	0
Total Assemblies Stored (Net of Discharges) ^b		0	164	388	564	764	956	1580	1772	1964	2152
Permanently Discharged		0	164	386	564	763	956	1580	1772	1964	2152
Temporarily Discharged (per flag)						0					
Temporarily Discharged (per logic)		0	0	2	0	1	0	0	0	0	0
Difference						0					
Total Assemblies MTIHM (Net of Discharges) ^c		0.0	30.5	72.0	104.5	141.6	175.9	244.9	279.0	313.1	346.2
Permanently Discharged		0.0	30.5	71.6	104.5	141.4	175.9	244.9	279.0	313.1	346.2
Temporarily Discharged (per flag)						0.0					
Temporarily Discharged (per logic)		0.0	0.0	0.4	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Difference						0.0					

^aCounts of assemblies that were discharged after the end of each cycle. The number can be understood by inserting them into the sentence: "After cycle __ there were __ assemblies that were in storage during each cycle."

^bNet cumulative totals of assemblies that were in storage during each cycle. The numbers can be understood by inserting them into the sentence: "During cycle __ there was a cumulative total of __ permanently/temporarily stored irradiated assemblies."

^cNet cumulative totals of weights of assemblies that were stored during each cycle. The numbers can be understood by inserting them into the sentence: "During cycle __ the cumulative weight of the permanently/temporarily stored assemblies was __."

Cycle N + 1 = 06

End of cycle date = SEP-14-1995

Figure D1. Energy Information Administration Quality Assurance Report (Continued)**Storage Pool Inventory**

Utility ID = 21 Utility Name: Gulf States Utilities Company
 Reactor ID = 01 Reactor Name: River Bend 1

Storage Pool Inventory as of 12/31/94

					Total	Initial	Perm.	Temp.
Assemblies Discharged ^a					Number	Uranium Content	Number	Number
Into Pool: 2101					956	175.865	956	0
Into Pool:					0	0.000	0	0
Into Pool:					0	0.000	0	0
Into Pool:					0	0.000	0	0
Into Pool:					0	0.000	0	0
Into Pool:					0	0.000	0	0
Into Pool:					0	0.000	0	0
Total					956	175.865	956	0
Missing					0	0.000		
Assemblies Stored ^b					Number	Weight (MTU)		
Into Pool: 2101	(BWR)	Pool Type	Canisters	Assmb. in Cans.				
	()	Wet	(0/	(0)	956	175.600		
Into Pool:	()		(0/	(0)	0	0.000		
Into Pool:	()		(0/	(0)	0	0.000		
Into Pool:	()		(0/	(0)	0	0.000		
Into Pool:	()		(0/	(0)	0	0.000		
Into Pool:	()		(0/	(0)	0	0.000		
Into Pool:	()		(0/	(0)	0	0.000		
Pool Contribution -2101 ^c					Total with Weights	Weight	Without Weights	
From Reac: 2101					956	175.865	0	
From Reac:					0	0.000	0	
From Reac:					0	0.000	0	
From Reac:					0	0.000	0	
From Reac:					0	0.000	0	
From Reac:					0	0.000	0	
From Reac:					0	0.000	0	
Total					956	175.865	0	

^aThe number of assemblies discharged and their total weight for the life of the reactor ordered by the storage pools at which these assemblies are stored. The total number of assemblies equals the number of permanently discharged assemblies (status code = D) plus the number of temporarily discharged assemblies (status code = T).

^bThe number of assemblies currently stored in each storage pool. Reactor type (BWR = Boiling-water reactor, PWR = Pressurized-water reactor) is indicated in parentheses. Pool type indicates Wet (storage pool) or Dry (dry cask) storage. The number of assemblies contained in canisters are shown in parentheses (canisters/assemblies).

^cThe number of assemblies stored in the pool indicated along with their total weight ordered by discharging reactor.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1994).

Technical Notes

Note 1: Reactor Status

Data for a total of 119 commercial light-water reactors are reported on the Form RW-859 survey. The total includes 118 reactors which have, will, or are discharging and/or storing nuclear fuel assemblies. Reports are also required for one reactor that is under construction and has not discharged spent nuclear fuel (Watts Bar 1). Four reactors that previously reported on the Form RW-859 survey [Bellefonte 1 and 2 and Watts Bar 2 (indefinitely deferred), and Fort St. Vrain (not a light-water reactor, also is shut down)], are no longer required to report. Nine reactors that are either shut down or retired (Dresden 1, Humboldt Bay, Indian Point 1, LaCrosse, Shoreham, Rancho Seco, San Onofre 1, Trojan, and Yankee Rowe) are maintained on the database for their historical information.

	<u>1992</u>	<u>1993</u>	<u>1994</u>
Operating Reactors	108	109	109
Shut Down / Retired Reactors	9	9	9
Under Construction	3	2	1
Total	120	120	^a 119

^aTotal does not include Watts Bar 2 which was classified as indefinitely deferred in 1994.

Note: Totals do not include Bellefonte 1 and 2, which are indefinitely deferred, and Fort St. Vrain, which is a high-temperature, gas-cooled reactor (HTGR) and was shut down in 1989. Totals also do not include four storage-only facilities.

Two reactors that have discharged spent nuclear fuel are not reported on Form RW-859, and their data are not included in this report. Hanford-N was placed in cold standby status by the DOE in 1988. Hanford-N spent fuel is used in DOE's Defense Programs. Three Mile Island 2, whose spent fuel now belongs to a DOE experimental research program, was shut down in 1979 because of an accident. Six other reactors began construction but are classified as indefinitely deferred: Perry 2, Bellefonte 1 and 2, Watts Bar 2, and Washington Nuclear Power 1 and 3.

Note 2: Storage Facilities

In addition to the spent nuclear fuel assemblies stored at reactor sites, a number of assemblies are stored at away-from-reactor storage facilities throughout the United States. Four of these facilities, General Electric Company (Morris Operation), West Valley Demonstration Project, Babcock & Wilcox Company (Lynchburg), and General Electric Company (Vallecitos Nuclear) report on the Form RW-859 survey. Data for these facilities are obtained directly from their survey submissions and verified by checking shipment data from the contributing reactors. Data for an additional four storage facilities [Idaho National Engineering Laboratory, Ohio (Battelle), South Carolina (Savannah River Site), and Washington (Hanford)] are compiled from shipment data submitted by the contributing reactors.

Table 11 contains complete data on assemblies stored at away-from-reactor storage facilities. These totals are also included in Table ES1, Figures ES1 and ES2, and the state totals in Table 12. Table 9 presents a compilation of data on shipments from utilities to away-from-reactor storage facilities. See Technical Note 7 (Reprocessed Assemblies) and Technical Note 12 (Data Adjustments) for more information.

Note 3: Pool Site Configurations

The format for presenting data in Table 10 relies on the individual reactor/pool site configurations. The configurations are shown graphically in the pictograms in Appendix C and include the presence of transfer canals, multiple pools servicing a single reactor, and multiple reactors sharing a single pool site. Each case is presented below.

- When two pools are joined by a transfer canal, only one pool site ID is assigned since there is only one loading area. Such is the case at Baltimore Gas and Electric Company's Calvert Cliffs 1 and 2. In Table 10, only one pool site ID (0501) is listed, but separate capacity and inventory data are listed for each reactor.

- Only two reactors have multiple pools. Cleveland Electric Illuminating Company's Perry 1 is assigned two pool site ID's (0901 and 0902) with separate capacity and inventory data for each. For purposes of this report, the capacity and inventory values are reported as for one pool. Carolina Power and Light Company's Harris 1 has four pools which share the same pool site ID (0703). Of these four pools, two are currently licensed and two are not usable at this time. While Harris 1 is a PWR reactor, the storage pools have the capability of storing both PWR and BWR fuel assemblies. In Table 10, separate capacity and inventory data are listed for each reactor type.
- Where two or more reactors share a single pool, as with Commonwealth Edison Company's Byron 1 and 2, only one pool site ID (1003) is listed, and the multiple reactors' data are combined and listed with that pool site.

Note 4: Alternative Data Sources

The majority of data in this report come directly from a compilation of data on the Form RW-859 survey. Additional data were obtained from the EIA publication, *World Nuclear Outlook 1995* (Table 4), and the Nuclear Regulatory Commission publication, *Information Digest 1995* (Tables B2 and B3). The following data were obtained from these publications:

- *World Nuclear Outlook 1995*
 - Capacity (net MWe) for all reactors; and,
 - Date of operation for Watts Bar 1.
- *Information Digest 1995*
 - Nuclear steam system supplier and design type for all reactors.

Note 5: HTGR Fuel Elements

One Form RW-859 reactor, Fort St. Vrain, is a high-temperature, gas-cooled reactor (HTGR), the only reactor of its kind and size in the world. An HTGR uses an inert gas (helium) as the primary coolant and a graphite moderator. Highly enriched uranium is used as initial fuel and thorium as a source of new fuel.

This HTGR has spent fuel wells instead of a pool. Each well holds one element (6 inches long, 1 inch in diameter). Data for Fort St. Vrain are listed in Tables 12, 13, and 14 but are not included in totals on those tables.

Fort St. Vrain shut down permanently in 1989 due to operational problems and a decommissioning license was granted by the Nuclear Regulatory Commission in November 1992. A total of 726 spent fuel elements (including 6 test elements) were discharged prior to this shut down and shipped to Idaho National Engineering Laboratory (INEL). An additional 18 spent fuel elements were shipped to INEL in October 1991. The remaining spent fuel elements are stored in an Independent Spent Fuel Storage Installation (ISFSI). The ISFSI was licensed on November 4, 1991, by the U.S. Nuclear Regulatory Commission. The license authorizes storage in the ISFSI of up to 1,482 spent fuel elements, 37 reflector control rod elements, and 6 neutron source elements. A total of 1,464 elements currently reside in the ISFSI.

Note 6: Reprocessed Assemblies

Spent fuel discharged from light-water reactors contains appreciable quantities of fissile (U-235, Pu-239), fertile (U-238), and other radioactive materials. These fissile and fertile materials can be chemically separated and recovered from the spent nuclear fuel. The recovered uranium and plutonium can, if economic and institutional conditions permit, be re-cycled for use as nuclear fuel. However, the Nuclear Nonproliferation Treaty of 1978 and other federal laws have prohibited this recovery in the United States.

A number of assemblies were discharged and reprocessed prior to 1972. Data on these reprocessed assemblies are not included in this report, except for 962 reprocessed assemblies reflected in Table 9 as shipments.

Note 7: Reactor Dates

Key dates in the life of a reactor are presented in Table 4. While the majority of the information presented in this table was obtained from Form RW-859 data, other data sources were used in cases where Form RW-859 data were not available (See Technical Note 4: Alternative Data Sources). Definitions for each of the key dates are as follows:

- Date of Operation—the unit received its full power operating license.
- License Expiration Date—year listed on the reactor's Nuclear Regulatory Commission operating license.
- Loss of Ability to Operate—year estimated by the utility on the Form RW-859 in which the utility would not continue reactor operation because of a lack of storage space for discharged fuel, absent spent fuel pickup by DOE. This also takes into consideration the

current licensed capacity and the total maximum established site capacity (in number of slots).

- Projected retirement year—utility estimate, either the license expiration date or a date based on a license extension.

Note 8: Burnup Ranges

Burnup is defined as the amount of thermal energy produced per unit mass of fuel irradiated or "burned." Burnup levels are generally expressed in units of gigawattdays thermal per metric ton of uranium (GWDt/MTU). Average burnups are presented in Tables 5, 6, 7, and 8, Figure 6, and Appendix B.

The burnup ranges represent the burnup values of associated batch average discharges. In this report, burnup ranges are grouped in following manner: 0-4.999 GWDt/MTU; 5.000-9.999 GWDt/MTU; 10.000-14.999 GWDt/MTU; etc.

Note 9: Storage Capacities

Form RW-859 respondents are required to report their licensed storage capacity and their maximum established spent fuel storage capacity (Table 10).

- Licensed storage capacity represents the number of slots licensed for spent nuclear fuel assemblies and canisters to be stored at a given site or spent nuclear fuel pool, as licensed by the Nuclear Regulatory Commission.
- Maximum established spent fuel storage capacity represents the maximum number of slots available for intact assembly or canister storage at some point in the future (between the reporting date and the reactor's end of life) considering any established or current studies or engineering evaluations at the time of submittal for licensing approval from the U.S. Nuclear Regulatory Commission. Utilities adjust their maximum established spent fuel storage capacity by adding capacity based on reracking or other engineering improvements or decreasing capacity by subtracting unusable pool locations.

Note 10: Missing Data

Most Form RW-859 respondents submit complete and accurate data. All Form RW-859 data are subject to extensive EIA quality assurance procedures. As of the final frozen file date of September 6, 1995, a limited number of data items were missing. In these instances, the missing

data items involved temporarily discharged assemblies. Utilities are not required to report complete data until these assemblies are permanently discharged. These items, listed below, are omitted from the tables in this report.

- The following 87 assemblies, all temporarily discharged, are missing assembly type codes, burnups, and enrichment (weight percent).

Davis-Besse	PWR	2
Indian Point 2	PWR	7
Indian Point 3	PWR	2
Maine Yankee	PWR	4
North Anna 2	PWR	1
Salem 1	PWR	22
Salem 2	PWR	31
South Texas 1	PWR	3
Three Mile Island 1	PWR	15

- The following 656 assemblies, all temporarily discharged, are missing burnups.

Big Rock Point	BWR	1
Browns Ferry 2	BWR	80
Callaway	PWR	2
Enrico Fermi 2	BWR	40
Indian Point 2	PWR	1
Kewaunee	PWR	4
Limerick 1	BWR	504
North Anna 1	PWR	12
North Anna 2	PWR	3
Salem 1	PWR	1
South Texas 1	PWR	4
Surry 1	PWR	4

- The following 12 assemblies, all temporarily discharged, are missing burnups and enrichments (weight percent).

Maine Yankee	PWR	4
Three Mile Island 1	PWR	8

Assembly weights were missing for 98 temporarily discharged assemblies. In these cases, assembly weights were calculated based on the average weight of assemblies with similar characteristics and imputed into the Form RW-859 data base. These data are included in the tables in this report.

Note 11: Rounding

All initial uranium contents presented in the tables of this Service Report are presented in metric tons of uranium (MTU) and are rounded to the nearest one-tenth of a MTU.

Totals may not exactly equal the sum of components because of independent rounding.

All average burnups in the tables of this report are presented in gigawattdays thermal per initial metric ton of uranium (GWDt/MTU) and are rounded to the nearest one-tenth. Average burnup totals are weighted averages and, as such, are not averages of individual table entries.

Note 12: Data Adjustments

The Form RW-859 survey is a total universe survey of all commercial nuclear reactors. Respondents usually submit complete data. As such, data adjustments are not usually necessary. In cases where errors or omissions are identified during the quality assurance process, EIA adjusts the data only after the respondent has been contacted to verify the change. A footnote has been added to tables where data for previous years have been revised. The note also states that current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical values change.

Note 13: Dry Storage at Utilities

A critical factor in the continued operation of some nuclear power plants in the disposal of spent nuclear fuel. In order to meet the demand for storage space, several utilities opt to increase their spent fuel storage capacity through the use of dry storage at Independent Spent Fuel Storage Installations (ISFSI's). The majority of ISFSI data in this report came directly from Form RW-859 submissions. In addition, several utilities contributed supplementary dry storage information regarding license status, vendor, storage type, model, and planned storage capacity (Table 13). Updated yearly projections of spent fuel assemblies scheduled to be stored in ISFSI's (Table 14, Figure 9) were also provided. These supplementary data are included in this report to present the most current and accurate data available.

Note 14: Shipment of Shoreham Nuclear Fuel to Limerick

In early 1993, PECO Energy Company (formerly Philadelphia Electric Company) entered into a three-party agreement with Long Island Power Authority (LIPA) and General Electric (GE) to reuse the nuclear fuel stored in the spent fuel pool at the Shoreham reactor since mid-1988. It was determined that PECO Energy Company would be able to use the partially spent fuel at its Limerick plant. LIPA was involved in the agreement due to its role as the new owner of the spent fuel

stored at Shoreham [ownership was previously transferred from Long Island Lighting Company (Lilco)]. General Electric, as the original manufacturer of the spent fuel, was required to inspect, repack, and warranty the fuel assemblies for use at the Limerick plant.

On September 23, 1993, the first of 33 scheduled fuel shipments departed from the Shoreham reactor for delivery to the Limerick plant. Through December 31, 1993, 18 shipments of spent fuel were completed, a total of 306 assemblies delivered. The balance of the fuel (254 assemblies) was shipped to the Limerick plant in 1994. These assemblies are included in the Limerick storage data through-out this report, as PECO Energy Company assumed ownership of the fuel once the assemblies passed through Shoreham's gate.

In April 1995, the Nuclear Regulatory Commission terminated LIPA's license to possess the Shoreham plant and released the site for unrestricted use. This termination of ownership will be reflected in next year's report.

Note 15: Shipment of Two Assemblies to Idaho National Engineering Laboratory

One General Electric-owned special assembly, pre-irradiated at General Electric (Vallecitos) away-from-reactor facility and discharged from Commonwealth Edison Company's Dresden 1 plant, was shipped to General Electric (Vallecitos Nuclear) for research in 1970. During the late 1970's, this assembly was then shipped to Idaho National Engineering Laboratory (INEL). Due to reporting error, the assembly has historically been reported at General Electric (Vallecitos Nuclear). Information regarding this transfer added to the 1994 Form RW-859 data base, and is reflected in Table 9 of this report.

In 1980, one stainless steel fuel assembly discharged from Northeast Utilities Service Company's Haddam Neck plant was shipped to Ohio (Battelle) away-from-reactor facility for storage. Upon shipment, ownership of the assembly was transferred from Northeast Utilities Service Company to the Department of Energy (DOE). On October 28, 1987, the assembly was shipped from Ohio (Battelle) to INEL. As DOE facilities are not required to report on the Form RW-859, the Form RW-859 data base has historically reported the location of this assembly at Ohio (Battelle). The 1994 Form RW-859 data base and Table 9 of this report have now been modified to reflect this transfer.

Note 16: Canisters and Nonfuel Components

The Form RW-859 "Nuclear Fuel Data" survey was revised in 1991 to collect information on all canisters and nonfuel components for each storage pool site. These data are found in Tables 15 through 22. It should be noted, however, that limitations exist within these data. A number of errors

and inconsistencies were discovered in reported canister and nonfuel component data during the processing and verification of the Form RW-859 surveys. Many of the errors were caused by the respondents misinterpreting or misreporting on the questions posed on the survey. Many of the inconsistencies found within the data, however, were corrected during verification telephone calls to respondents. Due to the large number of errors, some but not all have been corrected.

Glossary

Activity or Radioactivity: The rate at which radioactive material emits radiation, stated in terms of the number of nuclear disintegrations occurring per unit of time; the basic unit of radioactivity is the curie.

Assembly: (See Fuel Assembly.)

Assembly Class: A generic grouping for individual reactors based on the core configuration. The assembly class for a particular reactor is primarily a function of overall assembly size (length and transverse width). For pressurized-water reactors, assembly class is also a function of fuel rod array configuration. A key attribute of the assembly class scheme is that fuel assemblies in an assembly class are only used in reactors belonging to the same assembly class. Codes representing the assembly class are used as the first three characters of the eight-character assembly type codes. Codes for multiple-reactor assembly classes consist of a single-character code representing the reactor vendor and a two-character code identifying the particular assembly class. Codes for single-reactor assembly classes consist of the letter "X" and a two-character code representing the specific reactor. The assembly class also serves as the basis for the characterization of nonfuel components.

Assembly Identifier: (See Fuel Assembly Identifier.)

Assembly Type: Each assembly is characterized by a fabricator, rod-array size, and model type. An eight-digit assembly type code is assigned to each assembly type based on certain distinguishing characteristics, such as the number of rods per assembly, fuel rod diameter, cladding type, materials used in fabrication, and other design features.

Average Discharge Burnup: The average amount of energy produced by each assembly in a batch of spent fuel assemblies discharged from a nuclear reactor, reported in gigawattdays thermal per metric ton of uranium (GWDt/MTU).

Average Initial Enrichment Assay: Average enrichment for a fresh fuel assembly as specified and ordered in fuel cycle planning. This average includes axial blankets and axially/ radially zoned enrichments.

Average Initial Uranium Content: Average weight in kilograms of uranium (kg U) of fresh fuel assemblies in a batch before they are initially inserted into the reactor core. To be included in a batch, the initial uranium content of each assembly must be within 3 kg U of the average for boiling-water reactor assemblies and within 5 kg U of the average for pressurized-water reactor assemblies.

Axial Power Shaping Assemblies: Assemblies used at Babcock & Wilcox designed pressurized-water reactors to provide control over the power level of the reactor core during operation. They are very similar to control rod assemblies, but have less neutron absorbing material. Gray axial power shaping assemblies use a weaker neutron absorber, but serve an identical function.

Basket: A container used to store nonfuel components, nonfuel disassembly hardware, and/or other nonfuel materials in the spent fuel pool. Baskets are usually defined as rodlet or garbage and debris containers with dimensions less than that of an intact fuel assembly.

Batch: A logical grouping of assemblies with similar characteristics. All assemblies in a batch have the same assembly type, approximate initial loading weight, initial average enrichment, in core cycle history and discharge date, and approximately the same burnup after final discharge.

Boiling-Water Reactor (BWR): A light-water reactor in which water, used as both coolant and moderator, is allowed to boil in the core. The resulting steam is used directly to drive a turbine.

Burnable Poison Rod Assemblies (BPRA's): Assemblies that are inserted and locked into the guide tubes of pressurized-water reactor fuel assemblies in Babcock & Wilcox and Westinghouse Electric designed reactors to provide additional reactivity control. Both borosilicate glass and a boron carbide/aluminum oxide mixture can be used as the absorber for these assemblies. Because these absorbing materials are rapidly depleted, BPRA's are useful in limiting power output in the higher enriched assemblies that are now in use. The use of burnable poison rod assemblies varies greatly from utility to utility.

Burnup: A measure of the amount of energy obtained from fuel in a reactor. Typically, burnup is expressed as the amount of energy produced per unit weight of fuel irradiated or "burned." Burnup levels are generally measured in units of gigawattdays thermal per metric ton of uranium (GWDt/ MTU).

Burnup Range: A data structure that represents assemblies by their associated batch average discharge burnup. As a batch is defined as all assemblies having similar reactor and cycle histories, identical nominal initial enrichments, and burnup within 10 percent of the final mean average burnup, some assemblies placed within a range may not actually fall within that range. Burnup ranges are grouped in the following manner: 0-4.999 gigawattdays thermal per metric ton of uranium (GWDt/MTU); 5.000-9.999 GWDt/MTU; 10.000-14.999 GWDt/MTU; etc.

Canister: A container that is used to store fuel items (assemblies, rods, pieces, etc.) and/or nonfuel components. A canister has dimensions that fit within the envelope defined by the Standard Contract and can be handled similar to an assembly.

Cladding: A corrosion-resistant tube, commonly made of zirconium alloy or stainless steel, surrounding the reactor fuel pellets which provides protection from a chemically reactive environment and containment of fission products.

Commercial Operation: The phase of reactor operation that begins when power ascension ends and the operating utility formally declares the nuclear power plant to be available for the regular production of electricity. This declaration is usually related to the satisfactory completion of qualification tests on critical components of the unit.

Consolidation: The process whereby fuel rods are removed from an assembly and placed into a canister in a grid with spacing closer than that of an intact assembly. Consolidation maximizes density, lowers criticality, and improves heat transfer characteristics.

Control Blades: Blades (often called cruciforms) that control the nuclear chain reaction in boiling-water reactors by limiting the number of neutrons in the core. Made of strongly neutron-absorbing materials, control blades are inserted into the reactor core at planned shutdowns and during scrams. Particular groups of control blades are also used to control the power level of the reactor. Several pressurized-water reactors use(d) control blades.

Control Element Assemblies (CEA's): Assemblies that are used at Combustion Engineering (CE) designed pressurized-water reactors to provide control over the nuclear chain reaction by limiting the number of neutrons in the core. Made of strong neutron-absorbing materials, CEA's are inserted into the reactor core at planned shut downs and during scrams. At most CE designed reactors, CEA's consist of 4 or 5 control elements connected together by a control rod spider and fit into the guide tubes of a single assembly. At CE System 80 reactors, CEA's consist of either 4 or 12 control elements connected together by a control rod spider. The 4-element CEA's fit into the guide tubes of a single assembly, but the 12-element CEA's fit across 5 fuel assemblies in the core of the reactor.

Control Element Assembly Flow Plugs: Plugs that are used at some Combustion Engineering designed reactors in the same manner that thimble plug assemblies and orifice rod assemblies are used at Westinghouse Electric and Babcock & Wilcox designed reactors, respectively.

Control Rod Assemblies (CRA's): Assemblies used at Babcock & Wilcox designed pressurized-water reactors to provide control over the nuclear chain reaction by limiting the number of neutrons in the core. Made of neutron-absorbing materials, CRA's are inserted into the reactor core at planned shut downs and during scrams. They consist of 16 control rods connected together by a control rod spider and fit into each guide tube of a single assembly.

Coolant: Material used to conduct heat away from the reactor core to the steam cycle of a nuclear power plant. Liquids, gases, and liquid metals can be used as coolants. In light-water reactors, water is used as both the coolant and the moderator.

Core: The place in the reactor in which the nuclear fuel is irradiated and thermal energy is generated.

Core Size: The fixed number of fuel assemblies that can be irradiated at any one time in the reactor core.

Current Inventory: Number of spent nuclear fuel assemblies stored at a given site or spent nuclear fuel pool, at a given point in time.

Cycle: The time period from the startup of one reactor cycle to the startup of the following cycle.

Cycle End Date: The date of reactor shutdown for fuel discharge and refueling.

Decay or Radioactive Decay: The transition of a nucleus from one energy state to a lower one, usually involving the emission of a photon, electron, or neutron.

Design Electrical Rating (Capacity) Net: The nominal net electrical output of a nuclear unit as specified by the utility for the purpose of plant design.

Discharge Cycle: The sequential numbering of a reactor's refueling, from the start of reactor fuel loading to subsequent refueling. Initial loading, first operation, and first refueling is cycle 01.

Discharged Fuel: Irradiated fuel removed from a nuclear reactor during refueling. (See Spent Nuclear Fuel.)

Disposal Contract: (See Standard Contract.)

Dry Shielded Canister (DSC): The dry shielded canister is a cylindrical stainless steel pressure-retaining component which contains an internal basket assembly to maintain the spent fuel assemblies in a safe geometrical pattern during loading, transfer, storage, and postulated cask drop events.

Dry Storage Facilities: Shielded mobile or stationary containers, silos, modules, vaults, or dry wells filled with an inert gas or with air, as appropriate, in which spent fuel assemblies or canisters of highly radioactive material may be stored.

End of Cycle Date: (See Cycle End Date.)

Enrichment: A nuclear fuel cycle process in which the concentration of fissionable uranium is increased above its natural level of 0.71 percent. Enrichment is the process that changes the isotopic ratio in a material. The process currently utilized in the United States to increase uranium-235 to uranium-238 is gaseous diffusion of uranium hexafluoride (UF₆).

Enrichment Weight Percent: The isotopic percentage of uranium-235, by weight, that is present in fuel pellets.

Equilibrium Cycle: An analytical term that refers to fuel cycles that occur after the initial one or two cycles of a reactor's operation. For a given type of reactor, equilibrium cycles have similar fuel characteristics.

Fabricator: The manufacturer or supplier of a particular nuclear fuel assembly. The fabricator of an

assembly for a given reactor is not necessarily related to the reactor vendor or to the original fuel fabricator.

Fertile Material: Material that is not itself fissionable by thermal neutrons but can be converted to fissile material by irradiation. The two principal fertile materials are uranium-238 and thorium-232.

Fissile Material: Material that can be caused to undergo atomic fission when bombarded by neutrons. The most important fissionable materials are uranium-235, plutonium-239, and uranium-233.

Fuel Assembly: The basic unit of nuclear fuel. Uranium dioxide pellets are encased in cladding to form a fuel rod. Fuel rods are structurally connected to form a fuel assembly.

Fuel Assembly Identifier: A unique string of alphanumeric characters that identifies an assembly, bundle, or canister for a specific reactor in which it has been irradiated.

Fuel Channels: Metal (usually zircaloy) box-like items which are used in boiling-water reactors (BWR's) to control the flow of water through the core. BWR fuel bundles are inserted into the fuel channels to form the fuel assembly.

Fuel Cycle: The length of time a reactor is operated between refuelings (typically 12 to 24 months), including the refueling time, measured from the startup of one cycle to the startup of the following cycle.

Fuel Rods: Tubes of high-grade zircaloy or stainless steel that contain pellets of ceramic-grade uranium dioxide.

Gigawattday: A unit of measure equal to 1 billion wattdays.

High-Level Waste (HLW): The highly radioactive material resulting from the reprocessing of spent nuclear fuel (including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations), and other highly radioactive material that the Nuclear Regulatory Commission, consistent with existing law, determines by rule to require permanent isolation.

High-Temperature, Gas-Cooled Reactor (HTGR): A reactor that is cooled by helium and moderated by graphite.

Horizontal Storage Module (HSM): A steel reinforced concrete structure that may be constructed in-place at an Independent Spent Fuel Storage Installation (ISFSI) location or it may be prefabricated off-site and positioned on a reinforced concrete pad at the ISFSI. The principal design functions of the HSM are to provide radiation shielding for the fuel/dry shielded canister during storage and to provide a passive mechanism for the removal of decay heat by natural circulation of ambient air.

Incore Instrumentation: Instrumentation used to monitor the neutron flux within the core. In pressurized-water reactors, this instrumentation is inserted into an instrument tube in the fuel assembly.

Independent Spent Fuel Storage Installation (ISFSI): Dry storage facility located at reactor site in which spent fuel assemblies may be stored. (See Dry Storage Facilities.)

Integral Fuel Burnable Absorbers (IFBA's): Westinghouse Electric design neutron absorbers that are integral to the fuel assembly. IFBA's consist of a zirconium diboride coating on the exterior of selected fuel pellets.

Interim Storage: The temporary holding of wastes on or away from a nuclear plant site when disposal space is not available. Monitoring and human control are provided, and subsequent action involving treatment, transportation, or final disposition is expected.

Irradiated Nuclear Fuel: Nuclear fuel that has been exposed to radiation in the reactor core at any power level.

Licensed Storage Capacity: Maximum number of spent nuclear fuel assembly and canister slots licensed for use at a given site or spent nuclear fuel pool, as licensed by the Nuclear Regulatory Commission.

Licensed Thermal Power: The maximum thermal power of the reactor as authorized by the Nuclear Regulatory Commission, expressed in gigawatts thermal (GWt).

Light-Water Reactor (LWR): A nuclear reactor that uses water as the primary coolant and moderator, with slightly enriched uranium as fuel. There are two types of commercial light-water reactors: the boiling-water reactor (BWR) and the pressurized-water reactor (PWR).

Local Power Range Monitors: Incore instrumentation that is used to monitor the power level of General

Electric de-signed reactors during regular operation (at or near full power).

Low-Level Waste (LLW): Radioactive waste not classified as high-level waste, transuranic waste, spent nuclear fuel, or by-product material specified as uranium or thorium tailings and waste.

Maximum Established Storage Capacity: The maximum established spent fuel capacity for the site is defined by the Department of Energy as the maximum number of slots available for intact assembly storage at some point in the future (between the reporting date and the reactor's end of life) taking into account any established or current studies or engineering evaluations, at the time of submittal for licensing approval from the Nuclear Regulatory Commission.

Maximum Initial Pellet Enrichment Assay: The maximum enrichment in uranium-235 weight percent of all pellets contained in the fuel rods in a nuclear fuel assembly.

Metric Tons of Initial Heavy Metal (MTIHM): The weight of the initial fuel loading (in metric tons) used in an assembly.

Metric Tons Uranium (MTU): A measure of weight equivalent to 2,204.6 pounds of uranium and other fissile and fertile materials that are loaded into an assembly during fabrication of the assembly.

Moderator: A material, such as ordinary water, heavy water, or graphite, used in a reactor to slow down high-velocity neutrons, thus increasing the likelihood of further fission.

Multi-Purpose Canister (MPC): A hybrid of a universal storage cask and a dual purpose cask used to store, transport and dispose of spent nuclear fuel.

Net Summer Capability: The steady hourly output that generating equipment is expected to supply to a system load, exclusive of auxiliary power, as demonstrated by tests during summer peak demand.

Neutron Poison: A material (i.e., boron or cadmium) that absorbs neutrons readily. Insertion of one of these poisons results in a decrease in the reactivity (or neutron multiplying property) of the core, and consequently decreases the neutron density.

Neutron Sources: A base source of neutrons that initiate the nuclear chain reaction within the reactor core. Primary neutron sources are typically polonium- or plutonium-beryllium alloys; secondary neutron sources are typically antimony-beryllium alloys.

Nonfuel Components: Components that are not associated with a particular fuel. These include, but are not limited to, control spiders, burnable poison rod assemblies, control rod elements, thimble plugs, fission chambers, primary and secondary neutron sources, and boiling-water reactor fuel channels.

Nuclear Fuel: Fissionable materials that are enriched to such a composition that when placed in a nuclear reactor will support a self-sustaining fission chain reaction, producing heat in a controlled manner for process use.

Nuclear Fuel Cycle: The complete series of steps involved in supplying fuel for nuclear reactors, including mining, refining, enrichment, the original fabrication of fuel elements, their use in a reactor, and management of spent fuel and radioactive wastes. A closed fuel cycle includes chemical reprocessing to recover the fissionable material remaining in the spent fuel; an open fuel cycle does not.

Nuclear Power: Electricity generated by an electric power plant whose turbines are driven by steam produced in a reactor by heat from the fissioning of nuclear fuel.

Nuclear Power Plant: A facility in which heat produced in a reactor by the fissioning of nuclear fuel is used to drive a steam turbine.

Nuclear Reactor: An apparatus in which the nuclear fission chain reaction can be initiated, maintained, and controlled so that energy is released at a specific rate. The reactor apparatus includes fissionable material (fuel) such as uranium or plutonium; fertile material; moderating material (unless it is a fast reactor); a heavy-walled pressure vessel; shielding to protect personnel; provisions for heat removal; and control elements and instrumentation.

Nuclear Regulatory Commission (NRC): The U.S. government organization created under the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, as amended, that regulates the nuclear industry to insure public safety.

Nuclear Waste Policy Act of 1982, as amended: The Act mandates the establishment of repositories for the long-term storage and disposal of high-level radioactive waste and the collection of fees from utilities to finance these repositories. Under this Act, the Department of Energy (DOE) is given the responsibility for providing permanent disposal of spent fuel from domestic nuclear power reactors.

Operable (Nuclear): A U.S. nuclear generating unit is considered operable after it completes low-power testing and is issued a full power amendment to its operating license from the Nuclear Regulatory Commission.

Orifice Rod Assemblies: Short (typically 8-10") metal plugs that are inserted into the guide tubes of fuel assemblies in Babcock & Wilcox designed reactors to block the flow of coolant through guide tubes. They consist of 20 orifice rods connected together by a spider or similar hold-down device. Each orifice rod assembly fits into the guide tubes of a single assembly.

Other Instrumentation: Incore instrumentation, such as source range monitors (SRM's), intermediate range monitors (IRM's), and transverse incore probes (TIP's), that are used to monitor the power level of General Electric designed reactors.

Pool Crane: A machine for raising assemblies and depositing them into or out of a spent fuel storage pool.

Pool Site: One or more spent fuel storage pools that has a single cask loading area. Each dry cask storage area is considered a separate site from the storage pool.

Pressurized-Water Reactor (PWR): A nuclear reactor in which heat is transferred from the core to a heat exchanger via water kept under high pressure, so that high temperatures can be maintained in the primary system without boiling the water. Steam is generated in a secondary circuit.

Radiation: Particles or waves from atomic or nuclear processes and the process in which energy is emitted as particles or waves.

Radioactivity: (See Activity.)

Reactor, Commercial Power: Any unit of a commercial nuclear facility, licensed by the Nuclear Regulatory Commission, which generates electrical power.

Refueling: The process of shutting down a reactor and replacing some of the spent nuclear fuel assemblies. The refueling process can take from several weeks to months to accomplish.

Reinserted Fuel: Irradiated fuel that is discharged in one cycle and inserted in the same reactor during a subsequent refueling. In a few cases, fuel discharged from one reactor has been used to fuel a different reactor.

Repository: A permanent disposal facility for high-level or transuranic wastes and spent fuel.

Reprocessing: The dissolution of spent reactor fuel and separation of uranium, transuranic elements, and fission products.

Reracking: The installation of high-density racks to increase the storage capacity of a spent fuel pool.

Rod Array Configuration: Fuel assemblies are constructed from a number of individual fuel rods arranged together. These arrays have been of many different sizes, generally in square arrays. The number of fuel rods on each side of these arrays is referred to as the rod array configuration. Thus, an assembly with a rod array configuration of 14 X 14 has a total of 196 positions in a 14 X 14 array (most positions contain fuel rods, although some are guide tube locations, etc.).

Rod Cluster Control Assemblies (RCCA's): Assemblies that are used at Westinghouse Electric designed pressurized-water reactors to provide control over the nuclear chain reaction by limiting the number of neutrons in the core. Made of neutron-absorbing materials, RCCA's are inserted into the reactor core at planned shutdowns and during scrams. They consist of 16, 20, or 24 control rods connected together by a control rod spider. Each RCCA fits into the guide tubes of a single assembly.

Shipment: A generic term that covers all the diverse forms of shipments away from the discharging reactor's spent fuel pool including: shipped through the transfer canal to an adjoining spent fuel pool; shipped in a transport cask to an on-site storage facility; shipped to an off-site storage facility; or shipped in a storage cask to a dry storage facility. Excludes round-trip and intermediate shipments that do not affect inventories of spent nuclear fuel.

Shut down Date: Year, month, and day of shut down for fuel discharge and refueling. The date should be the point at which the reactor becomes subcritical.

Site: Any location under institutional control within which radioactive wastes are handled, stored, or disposed.

Slot: A physical position in a rack in a storage pool that is intended to be occupied by an intact assembly or equivalent (i.e., a canister or an assembly skeleton).

Spent Fuel Storage Pool: A borated water-filled pool in which assemblies, nonfuel components, canisters and baskets are stored.

Spent Nuclear Fuel: Irradiated fuel that is permanently discharged from a reactor at the end of a fuel cycle. Spent or irradiated fuel is usually discharged from reactors because of chemical, physical, and nuclear changes that make the fuel no longer efficient for the production of heat, rather than because of the complete depletion of fissionable material. Except for possible reprocessing, this fuel must eventually be removed from its temporary storage location at the reactor site and placed in a permanent repository. Spent nuclear fuel is typically measured either in metric tons of heavy metal (i.e., the heavy metal content of the spent fuel) or in metric tons of initial heavy metal (the initial mass of the uranium before irradiation). The difference between these two quantities is the weight of the fission products.

Standard Contract: The agreement between the Department of Energy (DOE) and the owners or generators of spent nuclear fuel and high-level radioactive waste disposal, under which DOE will make available nuclear waste disposal services to those owners and generators.

Startup: The first date electrical energy is generated by a reactor.

Storage: Operations designed to provide isolation and easy recovery of spent fuel (and other radioactive materials), which rely on continuous human monitoring, maintenance, and protection from human intrusion for a specified period of time.

Thimble Plug Assemblies: Short (typically 8-10") metal plugs that are inserted into the guide tubes of fuel assemblies in Westinghouse Electric designed reactors to block the flow of coolant through guide tubes. Thimble plug assemblies consist of 16, 20, or 24 thimble plugs connected together by a spider or similar hold-down device. Each thimble plug assembly fits into the guide tubes of a single assembly.

Transport Cask: Container that provides shielding during transportation of canisters of radioactive materials, available in several sizes for truck and rail use.

Transshipment: The shipment of spent nuclear fuel assemblies and canisters from one storage site to another using railroads or trucks as the primary mode of transportation.

Uranium (U): A heavy, naturally radioactive, metallic element (atomic number 92). Its two principally occurring isotopes are uranium-235 and uranium-238. Uranium-235 is the only isotope existing in nature to any appreciable extent that is fissionable by thermal neutrons. Uranium-238 absorbs neutrons to produce

a radioactive isotope that subsequently decays to plutonium-239, an isotope that also is fissionable by thermal neutrons.

Watt: The electrical unit of power. The rate of energy transfer equivalent to 1 ampere flowing under a pressure of 1 volt at unity power factor.

Bibliography and Notes

This section presents a listing of other publications containing information about nuclear waste along with a brief abstract of each. The most recent version of each report is listed.

Spent Fuel Storage Requirements: 1993 to 2040, Office of Civilian Radioactive Waste Management (DOE/RW-0431).

The source data contained in this report are based on individual reactor information supplied by the reactor owners on the Nuclear Fuel Data survey, Form RW-859. Historical inventories of spent fuel from existing, planned, and projected pressurized-water reactors and boiling-water reactors and one existing high-temperature, gas-cooled reactor, and utility estimates of future discharges, are presented through the year 2040. The ultimate needs for additional storage capacity are estimated. These estimates are based on the maximum capacities within current and planned at-reactor facilities and on any planned transshipments of fuel to other reactor sites or facilities.

1994 Acceptance Priority Ranking and Annual Capacity Report, Office of Civilian Radioactive Waste Management.

This document is based on spent nuclear fuel discharges as of December 31, 1993. The *Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radio-active Waste* (10 CFR 961) requires the U.S. Department of Energy to issue an *Acceptance Priority Ranking and Annual Capacity Report* for planning purposes. As required by the Standard Contract, the acceptance priority ranking is based on the date the spent nuclear fuel was permanently discharged, with the owners of the oldest spent nuclear fuel, on an industry-wide basis, given the highest priority. Projected waste acceptance rates are applied to priority ranking data, resulting in individual allocations for the owners and generators of the spent nuclear fuel. These allocations are listed and summarized in the report.

World Nuclear Outlook 1995, Energy Information Administration (DOE/EIA-0436-95).

This analysis report presents the current status and projections through 2010 of nuclear capacity, generation, and fuel cycle requirements for all countries in the world using nuclear power to generate electricity for commercial use. It also contains information and forecasts of developments in

the uranium market. Long-term projections of U.S. nuclear capacity, generation, and spent fuel discharges for three difference scenarios through 2040 are developed for the Department of Energy's Office of Civilian Radioactive Waste Management.

Uranium Industry Annual 1994, Energy Information Administration (DOE/EIA-0478-94).

This report presents data on U.S. uranium raw materials and marketing activities of the domestic uranium industry. It contains aggregated data reported by U.S. companies on the Uranium Industry Annual survey, Form EIA-858, and historical data from prior data collections and other pertinent sources.

Form RW-859 Canister Report, Energy Information Administration Contractor Report (Z, EIA-9508501), Z, INC., Silver Spring, Maryland.

The Nuclear Fuel Data survey, Form RW-859, collects detailed data on canisters and their contents. A canister is a container used to store fuel and/or nonfuel components with dimensions that fit within the envelope defined by the Standard Contract, and that can be handled similar to an assembly. The report presents detailed data on the size and contents of canisters stored in pools at commercial utilities that operate nuclear reactors. Each canister may contain an intact spent fuel assembly, consolidated spent fuel assemblies, spent fuel rods or pieces, nonfuel components, nonfuel hardware, or debris.

Form RW-859 Nonfuel Component Report, Energy Information Administration Contractor Report (CACI-ASG/EIA-9508502), CACI-ASG, Oak Ridge, Tennessee.

The Nuclear Fuel Data survey, Form RW-859, is now collecting detailed data on nonfuel components. According to the Standard Contract between the Department of Energy and the nuclear utilities (10 CFR 961), nonfuel components that are contained within the fuel assembly, or which are an integral part of the assembly, may be included as part of the spent nuclear fuel delivered for disposal. Other nonfuel components, generally used within or between assemblies and usually retired from service on a schedule that is different from that of the fuel assemblies are called nonfuel assembly (NFA) hardware. This report focuses on the specific NFA components which are listed in the contract, including control spiders, burnable absorber assemblies,

control rod elements, thimble plugs, fission chambers, primary and secondary neutron sources, and fuel channels.

Integrated Data Base for 1995: U.S. Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics, Office of Civilian Radioactive Waste Management (DOE/RW-0006, Rev. 11).

The Integrated Data Base Program contains current data on inventories and characteristics of commercial spent fuel and both commercial and U.S. Government-owned radioactive waste through December 31, 1994. The radioactive materials considered are spent fuel, high-level waste, transuranic waste, low-level waste, commercial uranium mill tailings, remedial action program wastes, commercial reactor and fuel cycle facility decommissioning wastes, highly radioactive materials that may require geologic disposal, and mixed (hazardous and radioactive) low-level waste. For these categories, current and projected inventories are given through the year 2020, and the radioactivity and thermal power are calculated based on reported or estimated isotopic compositions.

Characteristics of Potential Repository Wastes, Office of Civilian Radioactive Waste Management (DOE/RW-0184-R1, Volumes 1-4).

The Characteristics Data Base (CDB) provides the detailed technical characteristics of waste that will, or may, eventually

be disposed of in a deep geologic repository. This waste includes spent fuel from commercial light-water reactors (LWR's) and immobilized high-level waste from reprocessing. Other sources include spent fuel from non-LWR's such as test and experimental reactors, and various miscellaneous sources such as Greater-Than-Class-C low-level waste and radio-isotope capsules. The technical characteristics of relevant interest are physical descriptions and measurements, chemical compositions, radiological properties, inventories, and projected quantities. These data are collected, tabulated, organized, placed into computer data files, and made available to users in a range of formats, including hard-copy reports and menu-driven PC data bases.

Information Digest 1995 Edition, Nuclear Regulatory Commission (NUREG-1350, Volume 7).

This digest is a compilation of nuclear and NRC related data and is designed to provide a quick reference to major facts about the agency and the industry it regulates. In general, the data cover 1975 through 1994, with exceptions noted. Information on generating capacity and average capacity factor for operating U.S. commercial nuclear power reactors is obtained from monthly operating reports that are submitted directly to the NRC by the licensee. This information is reviewed by the NRC for consistency only. No independent validation and/or verification is performed.